



**Calhoun: The NPS Institutional Archive**  
**DSpace Repository**

---

Theses and Dissertations

1. Thesis and Dissertation Collection, all items

---

2008-12

Virtual communities in the law enforcement  
environment : do these systems lead to  
enhanced organizational memory

Yavneh, Jonathan S.

Monterey, California. Naval Postgraduate School

---

<http://hdl.handle.net/10945/3725>

---

Copyright is reserved by the copyright owner.

*Downloaded from NPS Archive: Calhoun*



<http://www.nps.edu/library>

Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

**Dudley Knox Library / Naval Postgraduate School**  
**411 Dyer Road / 1 University Circle**  
**Monterey, California USA 93943**



# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

## **THESIS**

**VIRTUAL COMMUNITIES IN THE LAW ENFORCEMENT  
ENVIRONMENT: DO THESE SYSTEMS LEAD TO  
ENHANCED ORGANIZATIONAL MEMORY**

by

Jonathan S. Yavneh

December 2008

Thesis Advisor:

Thesis Co-Advisor:

Richard Bergin

Robert Josefek

**Approved for public release; distribution is unlimited**

THIS PAGE INTENTIONALLY LEFT BLANK

<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> December 2008	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis	
<b>4. TITLE AND SUBTITLE</b> Virtual Communities in the Law Enforcement Environment: Do These Systems Lead to Enhanced Organizational Memory			<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b>			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000				
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A			<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>	
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited			<b>12b. DISTRIBUTION CODE</b> A	
<b>13. ABSTRACT (maximum 200 words)</b> <p>There is a large body of research on the topic of knowledge management and organizational memory, as well as on the topic of communities of practice and virtual communities of practice. This research looked at three law enforcement and intelligence related case studies and how the use of Virtual Communities of Practice (VCoP) in these law enforcement environments can mitigate the loss of organizational memory. This research looked at these VCoPs in an attempt to determine if explicit and tacit knowledge shared in these VCoP environments can be codified and ultimately reduce the loss of organizational memory. The research methodology used in this thesis project is the case study approach. A qualitative analysis of messages, postings, and conversations contained within the VCoP was used to identify the transfer of both explicit and tacit knowledge. Data collection and analysis was conducted based on three VCoP sites. The research conducted for this thesis suggested that a VCoP can mitigate the loss of organizational memory. Interview data, along with case site reviews, support the use of VCoP to mitigate the loss of organizational memory while providing a means for the transfer of explicit knowledge by those participating in the VCoP.</p>				
<b>14. SUBJECT TERMS</b> Virtual Communities of Practice, Organizational Memory, Law Enforcement, Communities of Practice, Mitigate the loss of organizational memory			<b>15. NUMBER OF PAGES</b> 87	
			<b>16. PRICE CODE</b>	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UU	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)  
Prescribed by ANSI Std. Z39-18

THIS PAGE INTENTIONALLY LEFT BLANK

**Approved for public release; distribution is unlimited**

**VIRTUAL COMMUNITIES IN THE LAW ENFORCEMENT ENVIRONMENT:  
DO THESE SYSTEMS LEAD TO ENHANCED ORGANIZATIONAL MEMORY**

Jonathan S. Yavneh  
Lieutenant, City of Miami Police Department  
B.S., Florida International University, 1991

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES  
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL  
December 2008**

Author: Jonathan S. Yavneh

Approved by: Richard Bergin  
Thesis Advisor

Robert Josefek, Ph.D.  
Co-Advisor

Harold A. Trinkunas, Ph.D.  
Chairman, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

There is a large body of research on the topic of knowledge management and organizational memory, as well as on the topic of communities of practice and virtual communities of practice. This research looked at three law enforcement and intelligence related case studies and how the use of Virtual Communities of Practice (VCoP) in these law enforcement environments can mitigate the loss of organizational memory. This research looked at these VCoPs in an attempt to determine if explicit and tacit knowledge shared in these VCoP environments can be codified and ultimately reduce the loss of organizational memory. The research methodology used in this thesis project is the case study approach. A qualitative analysis of messages, postings, and conversations contained within the VCoP was used to identify the transfer of both explicit and tacit knowledge. Data collection and analysis was conducted based on three VCoP sites. The research conducted for this thesis suggested that a VCoP can mitigate the loss of organizational memory. Interview data, along with case site reviews, support the use of VCoP to mitigate the loss of organizational memory while providing a means for the transfer of explicit knowledge by those participating in the VCoP



THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>A.</b>	<b>PROBLEM STATEMENT .....</b>	<b>1</b>
<b>B.</b>	<b>RESEARCH QUESTIONS.....</b>	<b>2</b>
<b>C.</b>	<b>LITERATURE REVIEW .....</b>	<b>2</b>
1.	Organizational Memory .....	2
2.	Explicit and Tacit Knowledge.....	3
3.	Virtual Communities of Practice (VCoP) .....	6
4.	Technology that Supports Virtual Communities of Practice (VCoP).....	11
<b>II.</b>	<b>TECHNOLOGY SYSTEMS THAT SUPPORT VIRTUAL COMMUNITIES OF PRACTICE .....</b>	<b>13</b>
<b>A.</b>	<b>EMAIL LISTS.....</b>	<b>13</b>
<b>B.</b>	<b>BLOGS.....</b>	<b>13</b>
<b>C.</b>	<b>CHAT .....</b>	<b>14</b>
<b>D.</b>	<b>DISCUSSION BOARD.....</b>	<b>14</b>
<b>E.</b>	<b>INSTANT MESSAGING .....</b>	<b>15</b>
<b>F.</b>	<b>MEMBER DIRECTORY .....</b>	<b>16</b>
<b>G.</b>	<b>MICROSOFT SHAREPOINT TECHNOLOGIES.....</b>	<b>16</b>
<b>H.</b>	<b>MISCELLANEOUS SUPPORTING TECHNOLOGIES .....</b>	<b>17</b>
1.	Polling.....	17
2.	Presence Indicators.....	17
3.	Tags .....	18
4.	Behavioral Parameters .....	18
<b>III.</b>	<b>METHODOLOGY .....</b>	<b>19</b>
<b>A.</b>	<b>MIAMI POLICE DEPARTMENT’S USE OF SHAREPOINT TECHNOLOGY WITHIN THEIR TRAINING UNIT .....</b>	<b>21</b>
<b>B.</b>	<b>INTERNATIONAL ASSOCIATION OF COMPUTER INVESTIGATIVE SPECIALISTS (IACIS) .....</b>	<b>22</b>
<b>C.</b>	<b>NEW JERSEY REGIONAL OPERATIONS AND INTELLIGENCE CENTER (ROIC) TASK FORCE.....</b>	<b>22</b>
<b>IV.</b>	<b>LAW ENFORCEMENT’S USE OF VIRTUAL COMMUNITIES OF PRACTICE.....</b>	<b>27</b>
<b>A.</b>	<b>MIAMI POLICE DEPARTMENT’S USE OF SHAREPOINT TECHNOLOGY WITHIN ITS TRAINING UNIT.....</b>	<b>27</b>
1.	Option A: Discussion Board Service .....	32
2.	Option B: Custom List Service .....	32
3.	User Demographic .....	35
4.	Types of Technology Used by the Miami Police Department’s Training Unit to Facilitate Their VCoP.....	36

B.	INTERNATIONAL ASSOCIATION OF COMPUTER INVESTIGATIVE SPECIALISTS (IACIS) .....	36
1.	User Demographic .....	38
2.	Types of Technology Used by IACIS to Facilitate VCoP .....	38
C.	NEW JERSEY REGIONAL OPERATIONS AND INTELLIGENCE CENTER (ROIC) TASK FORCE .....	41
1.	User Demographic .....	43
2.	Types of Technology Used by the ROIC to Facilitate VCoP .....	44
V.	ANALYSIS .....	47
VI.	CONCLUSION .....	57
A.	BEST PRACTICES FOR LAW ENFORCEMENT'S IMPLEMENTATION OF VCOP TECHNOLOGIES AS AN ORGANIZATIONAL MEMORY SYSTEM TO SUPPORT KNOWLEDGE CODIFICATION AND TRANSFER.....	62
	LIST OF REFERENCES.....	69
	INITIAL DISTRIBUTION LIST .....	73

## LIST OF FIGURES

Figure 1.	What is a SharePoint Server?.....	29
Figure 2.	SharePoint Server.....	31
Figure 3.	Sample Setup .....	34

THIS PAGE INTENTIONALLY LEFT BLANK

## **ACKNOWLEDGMENTS**

I would like to express my appreciation to the city of Miami Police Department, specifically, to Chief John F. Timoney and Assistant Chief Adam Burden. They encouraged my participation in this outstanding program. From the very beginning, and throughout the eighteen months, they supported my attendance. Thank you for the endorsement and your confidence in me.

It is with the sincerest gratitude that I thank my thesis advisors, Professor Richard Bergin and Dr. Robert Josefek. From the onset Professor Bergin and Dr. Josefek provided guidance, feedback, and encouragement. With their wealth of knowledge and subject matter expertise they helped to focus my efforts with timely and valuable comments and questions. They both took the time to make themselves available to me whenever I needed their assistance; thank you!

I would also like to thank the staff of the Naval Postgraduate School, Center for Homeland Defense and Security. The program and the logistical support were always very professional and supportive to the needs of the students. It is evident that the Center's staff works very hard to provide the highest levels of quality support. To the Center's academic team of professors and guest lecturers, keep up the great work in this most worthwhile endeavor. The passion and commitment of this great team shows through in each course.

I would like to especially thank Lieutenant Raymond Guidetti of the New Jersey State Police and graduate of the Naval Postgraduate School, Center for Homeland Defense and Security. Lieutenant Guidetti took the time out of his busy schedule to speak with me on several occasions throughout this eighteen month program. He made the time to discuss his perspectives on various topics related to this thesis and on the New Jersey Regional Operations Intelligence Center.

To my fellow cohort members, it was my honor and privilege to participate in this program with each of you. Thank you for the good times and for the interesting and insightful discussions.

THIS PAGE INTENTIONALLY LEFT BLANK

## **I. INTRODUCTION**

### **A. PROBLEM STATEMENT**

United States law enforcement agencies are reporting increased rates of staff turnover due to retirement, transfers, and other factors.<sup>1</sup> When experienced officers and analysts leave, they take with them a wealth of knowledge. For example, within intelligence and fusion centers, the analytical skills learned and network relationships built over time are not easily transferred to replacements. Over time, officers and analysts become attuned to regional intelligence matters. They become infused with ongoing analysis projects and often build unique perspectives of current events based on shared information and experiences. They establish network contacts with both civilian and governmental representatives and sources which enable them to make rapid contact with the appropriate resources when necessary. The work environment is often comprised of representatives from several agencies sharing information together. For example, the state of New Jersey established a Regional Operations and Intelligence Center where members are “assigned from the Federal Bureau of Investigation, Department of Homeland Security, Alcohol Tobacco and Firearms, Immigration and Customs Enforcement, Federal Air Marshal Service, and the U.S. Coast Guard, in addition to personnel from the State Police, New Jersey Office of Homeland Security and Preparedness, and the Department of Transportation.”<sup>2</sup> In these multi-agency environments officers and analysts learn the subtle differences in documentation requirements made by the various participant agencies involved, as well as many other administrative support functions. This research will address this loss of knowledge, both tacit knowledge and explicit knowledge, within the context of intelligence and fusion centers.

---

<sup>1</sup> Dwayne Orrick, "Police Turnover," *Police Chief Magazine* 72, no. 9 (2005).

<sup>2</sup> Government Accountability Office, "Homeland Security: Federal Efforts Are Helping to Alleviate Some Challenges Encountered by State and Local Information Fusion Centers," GAO 08-35 (Washington, D.C.: Government Accountability Office, 2007).



## **B. RESEARCH QUESTIONS**

Does the sharing of data, information, and knowledge in a law enforcement and intelligence focused virtual community help to transfer tacit knowledge and mitigate the loss of organizational memory? This research will look at the information available in various online law enforcement and intelligence-related, virtual communities to determine if these communities and the systems that allow them to transfer tacit knowledge and to better share and store explicit knowledge mitigate the loss of organizational memory.

Specifically, this research explored whether or not collaborative technologies in place to support data, information, and knowledge sharing within virtual communities housed within intelligence and fusion centers increase organizational memory and whether or not they better enable new officers and analysts to more quickly assimilate into an intelligence / fusion center.

## **C. LITERATURE REVIEW**

The literature relevant to this study can be categorized as academic journal articles, academic reports, previous thesis work, data from websites related to organizational memory and knowledge management, and government sponsored reports (for example, Congressional Research Reports and Government Accounting Office reports). Overall, numerous research materials were reviewed from a wide range of academic and knowledge management industry sources.

### **1. Organizational Memory**

A review of this literature revealed a significant amount of material on the topic of organizational memory. According to Walsh and Ungson, in its most basic sense, organizational memory can be referred to as “stored information from an organization’s history that can be brought to bear on present decisions.”<sup>3</sup> Overall the literature would

---

<sup>3</sup> James P. Walsh and Gerardo Ungson, "Organizational Memory and the Problem of Anthropomorphism," *Academy of Management Review* 16, no. 1 (1991): 61.

suggest that organizations acquire, store, and have a means for the retrieval of information by organization members.<sup>4</sup> As pointed out by Fernando Olivera,

An organization's ability to collect, store and use knowledge it has generated through experience can have important consequences for its performance. Storing and using stored knowledge effectively can buffer the organization from the disruptive effects of turnover, facilitate coordination, contribute to the development of innovative products, and may even serve to rebuild an organization.<sup>5</sup>

Understanding what is meant by the term information is important and many researchers spend time trying to define the differences between the terms data, information and knowledge. Throughout much of the literature reviewed there was a consensus that in general the following definitions were appropriate, and, therefore, this thesis has used them. According to Maryam Alavi:

**Data:** is referred to as raw numbers and facts.

**Information:** referred to as processed data.

**Knowledge:** is information possessed in the mind of individuals: it is personalized information (which may or may not be new, unique, useful, or accurate) related to facts, procedures, concepts, interpretations, ideas, observations, and judgments.<sup>6</sup>

## 2. Explicit and Tacit Knowledge

Knowledge is further articulated as tacit or explicit. According to Alavi,

Tacit knowledge is comprised of both cognitive and technical elements. The cognitive element refers to an individual's mental models consisting of mental maps, beliefs, paradigms, and viewpoints.

---

<sup>4</sup> Charles C. Manz, Vakas Anand, and William H. Glick, "An Organizational Memory Approach to Information Management," *Academy of Management Review* 23, no. 4 (1998): 806.

<sup>5</sup> Fernando Olivera, "Memory Systems in Organizations: An Empirical Investigation of Mechanisms for Knowledge Collection, Storage and Access," *Journal of Management Studies* 37, no. 6 (2000): 811.

<sup>6</sup> Maryam Alavi, "Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS Quarterly* 25, no. 1 (2001): 109.

The explicit dimension of knowledge is articulated, codified, and communicated in symbolic form and/or natural language.<sup>7</sup>

The context in which an individual is exposed to data and information is important to note in the formulation of that individual's creation of knowledge. Using his or her tacit knowledge, an individual will frame and give background to circumstances that help him or her to interpret explicit knowledge. According to Alavi,

...the inextricable linkage of tacit and explicit knowledge suggests that only individuals with a requisite level of shared knowledge can truly exchange knowledge: if tacit knowledge is necessary to the understanding of explicit knowledge, then in order for individual B to understand individual A's knowledge, there must be some overlap in their underlying knowledge bases.<sup>8</sup>

Across the literature, various aspects of tacit knowledge are discussed and the underlying theme is that tacit knowledge is difficult to convey to someone. This knowledge is based on one's personality, experiences, attitudes, and style, all of which often require long term exposure to the individual in order to be conveyed and extracted. It is difficult for another to make sense of information and internalize it to knowledge outside the original context.<sup>9</sup> As far as explicit knowledge, the consensus amongst the literature is that it "is relatively easy to codify and teach."<sup>10</sup> Organizations can use Virtual Communities of Practice (VCoP) to enable the codification of information based on user's exchanges within the VCoP.

Every organization has some form of organizational memory. Various sharing methodologies are used depending on the type of knowledge to be shared. As pointed out by Stoyko and Fang, "information systems can be developed to capture and store knowledge and to facilitate sharing and communication. These information systems can be 'high-tech' (advanced computer systems) or 'low-tech' (physical archives such as

---

<sup>7</sup> Maryam Alavi, "Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS Quarterly* 25, no. 1 (2001): 110.

<sup>8</sup> Alavi, Maryam, "Knowledge Management," 122.

<sup>9</sup> Peter Stoyko and Yulin Fang, "Lost and Found: A Smart Practice Guide to Managing Organizational Memory," (Ottawa: Canada School of Public Service, 2007), 18.

<sup>10</sup> Ibid., 29.

libraries).”<sup>11</sup> Some examples include: after action reviews, exit interviews, learning histories, lessons learned inventory, communities of practice, phased retirement and succession systems, network based solutions, and document repositories and organization portals.<sup>12</sup> How explicit and tacit knowledge within an organization is managed, stored, and referenced for future use can lead to benefits and consequences for an organization. As an example of a benefit of maintaining organizational memory, an organization can gain insight from lessons learned and save itself from repeating costly mistakes. As an example of a consequence of not sharing tacit knowledge, an organization that fails to have experienced individuals in key roles transfer their knowledge to others before they leave the organization can hamper a replacements ability to become productive in a timely manner. In these situations, much time and effort is exhausted by replacements in an attempt to become proficient in the new work domain.

How an organization acquires, stores, and retrieves information and explicit knowledge for future retrieval is, therefore, important. By creating systems that maintain explicit knowledge and in so doing systems that increase an organization’s memory allows users of those systems to save time and become more efficient. By reviewing these memory systems users can avoid previously documented pitfalls as well as learn shortcuts to make their tasks more efficient. It is important to design a collaborative environment that fosters the sharing of information between users and creates a community atmosphere. Knowledge management systems alone tend to store data and information consistent with explicit knowledge whereas VCoP have the potential to create a collaborative community environment where tacit knowledge is expressed. According to McDermott,

We acquire knowledge by participating in a community – using the tools, ideas, techniques, and unwritten artifacts of that community; whereas we acquire information by reading, observing, or otherwise absorbing it.

---

<sup>11</sup> Stoyko and Fang, "Lost and Found," 18.

<sup>12</sup> Ibid., 28.

Ironically, when we look at our experience, the heart of knowledge is not the great body of stuff we learn, not even what the individual thinks, but a community in discourse, sharing ideas.<sup>13</sup>

### **3. Virtual Communities of Practice (VCoP)**

Communities of Practice and Virtual Communities of Practice (VCoP) are defined in various terms and degrees throughout the literature. The concept of communities of practice (CoP) has been discussed for some time. The actual term was coined by anthropologist Jean Lave and Etienne Wenger.<sup>14</sup> According to Etienne, “Communities of Practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.”<sup>15</sup> Communities of practice have the potential to create an environment where ideas are exchanged and constructive discourse between members allow for participants and observers to develop tacit knowledge from these exchanges. As pointed out by Allen, Ure, and Evans,

CoPs provide a place where learners can view a situation or problem from multiple perspectives. As participants interact and negotiate with others, they receive valuable viewpoints. They learn that one solution to a specific problem may not be the only solution and that some problems require multiple and varied solutions. For this reason, a conflict of perspectives is actually desirable because it provides a beneficial juxtaposition. Considering multiple perspectives forces employees to think critically and reflect on their practices. In essence, multiple perspectives lead to additional ways of doing things—they give employees more tools in their tool belts. Without multiple perspectives, problems may become oversimplified and never really resolved (Driscoll, 2000).<sup>16</sup>

---

<sup>13</sup> Richard McDermott, "Why Information Technology Inspired but Cannot Deliver Knowledge Management," *California Management Review* 41, no. 4 (1999): 110.

<sup>14</sup> Etienne Wenger, "Communities of Practice: A Brief Introduction," Etienne Wenger, <http://www.ewenger.com/theory/>.

<sup>15</sup> Ibid.

<sup>16</sup> Stephanie Allen, Donna Ure, and Stephen Evans, *Virtual Communities of Practice as Learning Networks* (Provo, Utah: Brigham Young University, 2003), 15.

Allen, Ure, and Evan's description is a good example of how exchanges within a CoP can lead to the creation of tacit knowledge amongst the members. Additionally, organizational memory can be increased by their use as well. According to Stoyko and Fang,

Communities of practice preserve organizational memory by stewarding its field without becoming over-reliant on a single person: "They grow, evolve, and change dynamically, transcending any particular member and outliving any particular task." In this sense, a community of practice is not instrumental; that is to say, it cannot be directed unilaterally by an outside authority. Nonetheless, if a community's subject is aligned to an organization's business goals, then a high degree of relevance usually follows.<sup>17</sup>

Wenger went on to identify three crucial characteristics that when combined and developed together, formulate a community of practice; the domain, the community, and the practice:

***The domain:*** A community of practice is not merely a club of friends or a network of connections between people. It has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain, and therefore a shared competence that distinguishes members from other people. (You could belong to the same network as someone and never know it.) The domain is not necessarily something recognized as "expertise" outside the community. A youth gang may have developed all sorts of ways of dealing with their domain: surviving on the street and maintaining some kind of identity they can live with. They value their collective competence and learn from each other, even though few people outside the group may value or even recognize their expertise.<sup>18</sup>

The domain is an important concept as it relates to the transfer of tacit knowledge between organizational members. It allows those with a shared interest and commitment to an idea to share their expertise and experiences with those who are also committed to that area of interest. They share the belief of the topic's importance and learn from each other through the exchange of ideas. According to Wenger,

---

<sup>17</sup> Stoyko and Fang, "Lost and Found," 37.

<sup>18</sup> Wenger, "Communities of Practice."

***The community:*** In pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share information. They build relationships that enable them to learn from each other. A website in itself is not a community of practice. Having the same job or the same title does not make for a community of practice unless members interact and learn together. The claims processors in a large insurance company or students in American high schools may have much in common, yet unless they interact and learn together, they do not form a community of practice. But members of a community of practice do not necessarily work together on a daily basis. The Impressionists, for instance, used to meet in cafes and studios to discuss the style of painting they were inventing together. These interactions were essential to making them a community of practice even though they often painted alone.<sup>19</sup>

The community is an integral part of transferring knowledge, both tacit and explicit. As discussed by Nonaka,

Although ideas are formed in the minds of individuals, interaction between individuals typically plays a critical role in developing these ideas. That is to say, "communities of interaction" contribute to the amplification and development of new knowledge. While these communities might span departmental or indeed organizational boundaries, the point to note is that they define a further dimension to organizational knowledge creation, which is associated with the extent of social interaction between individuals that share and develop knowledge.<sup>20</sup>

According to Wenger the practice can be described as,

***The practice:*** A community of practice is not merely a community of interest--people who like certain kinds of movies, for instance. Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction. A good conversation with a stranger on an airplane may give you all sorts of interesting insights, but it does not in itself make for a community of practice. The development of a shared practice may be more or less self-conscious. The "windshield wipers" engineers at an auto manufacturer make a concerted effort to collect and document the tricks and lessons they have learned into a knowledge base. By contrast, nurses who meet regularly for lunch in a hospital cafeteria may not realize that

---

<sup>19</sup> Wenger, "Communities of Practice."

<sup>20</sup> Ikujiro Nonaka, "A Dynamic Theory of Organizational Knowledge Creation," *Organization Science* 5, no. 1 (1994): 15.

their lunch discussions are one of their main sources of knowledge about how to care for patients. Still, in the course of all these conversations, they have developed a set of stories and cases that have become a shared repertoire for their practice.<sup>21</sup>

By experiencing the interactions and feedback of other community members, tacit knowledge is shared while at the same time a level of trust is built amongst community members. In the sharing of this tacit knowledge, some members will form new knowledge while others may be able to convert the tacit knowledge into more codifiable explicit knowledge. An example of this would be through a member's use of metaphors and analogies. According to Nonaka, "one effective method of converting tacit knowledge into explicit knowledge is the use of metaphor."<sup>22</sup>

Based on the literature reviewed the definition most consistent with the materials reviewed was that of author Dr. Stephanie Allen. Dr. Allen's research shows that:

Communities of Practice: Groups of individuals who participate in a collection of activities, share knowledge and expertise, and function as an interdependent network over an extended period of time with the shared goal of furthering their 'practice' or doing their work better." This definition is intended to distinguish CoPs from "teams," though the terms are often used interchangeably, because their structures and purposes are quite different. Teams are generally created to accomplish a single task and they typically disband when that task is completed. CoPs, on the other hand, are built around a practice, with a long-term objective that causes them to persist far beyond individual tasks.

Virtual Communities of Practice (VCoP): are physically distributed groups of individuals who participate in activities, share knowledge and expertise, and function as an interdependent network over an extended period of time, using various technological means to communicate with one another, with the shared goal of furthering their 'practice' or doing their work better.<sup>23</sup>

---

<sup>21</sup> Wenger, "Communities of Practice."

<sup>22</sup> Nonaka, "A Dynamic Theory," 20.

<sup>23</sup> Allen, Ure, and Evans, "Virtual Communities," 7.



The research suggests that both communities of practice and VCoP can provide a user with the atmosphere to transfer tacit knowledge, and acquire, store, and retrieve explicit knowledge.<sup>24</sup> Both a CoP and a VCoP can create an area where data, information, and knowledge sharing can take place between individuals and groups of individuals with shared interests. The user can learn from codified documents and similar items (explicit) and where questions arise can reach out to other members for clarification, guidance and assistance (tacit). By utilizing these VCoPs an organization can increase the level of tacit knowledge transfer of those exposed to the shared knowledge. It is widely accepted in the research that the acquisition of knowledge is greatly facilitated by interaction and collaboration with others. VCoP provides for this collaborative environment.<sup>25</sup>

Although the concept of implementing VCoPs in an attempt to increase a users' tacit knowledge sharing is not new, there is a gap in the research when it comes to how these efforts and implementations are made to foster maintaining organizational memory. For a VCoP to flourish and persist, it must be a value to the organization and the users. The data, information, and knowledge shared and created must be applicable, actionable, and relevant to users' work.<sup>26</sup> The usefulness of the participation in these VCoP can be influenced by a number of factors. Valuable research can be conducted to look at and determine if these VCoP data, information, and knowledge sharing mitigates the loss of organizational memory and the transfer of tacit knowledge.

It is important for organizations to be able to harness and later use both explicit and tacit knowledge. It is widely accepted that explicit knowledge is easier to codify than tacit knowledge; however, both types are important factors when it comes to mitigating the loss of organizational memory. Overall, CoP have the potential for creating environments that support the sharing of information and creating an atmosphere of community. A community, where members can help each other and through their exchanges of information can share explicit knowledge while at the same time, through

---

<sup>24</sup>Allen, Ure, and Evans, "Virtual Communities," 18.

<sup>25</sup> Michael Bieber, "Towards Knowledge-Sharing and Learning in Virtual Professional Communities" (presentation at IEEE Computer Society - Proceedings of the 35th Hawaii International Conference on System Sciences, Hawaii, 2002), 2.

<sup>26</sup> Allen, Ure, and Evans, "Virtual Communities," 38.

their interactions, can potentially create tacit knowledge sharing. Through the use of new technologies, it has become easier for traditional CoP to grow into VCoP. The following section will briefly describe some of the technologies that support VCoP.

#### **4. Technology that Supports Virtual Communities of Practice (VCoP)**

There are many computer based technologies that can support group and community interactions. More and more software development companies are designing software specifically targeting the management of online community content. These technologies enable the codification of explicit knowledge into knowledge bases for later use. As backend server technologies improve over time, the ease of use and site content management improves as well. There are certain key features that should be present in technology deployments that will be used to support VCoP. The most applicable technology at the time of this writing is a system based on web technologies. One of the primary reasons for using web-based technologies is that the client side of the technology is not platform dependent. By using cross platform web technologies there is greater potential for a broader community consisting of a wider user base. Rather than limiting a community's members to one computer operating system, cross platform systems allow users of Microsoft Windows, Apple Macintosh, Linux, and other operating systems to be able to access the technology with little effort. This increases the potential usefulness of VCoP because users can share information and knowledge whether they use the same computer operating systems or not. Regardless of a client's operating system, web-based technologies can be accessed from a standard web browser. Specialized software is not needed on the client side, and the user interface can be consistent amongst the client population. Additionally, the technology has improved to the point that minimal information technology (IT) knowledge is needed for site administration. Much of the administration can be done through web interfaces, making the IT administration costs significantly lower than legacy client-server systems.

There are some issues to consider involving which software tool is most appropriate for an organization to use to facilitate VCoP environments. The technology should be thought of as a facilitation mechanism for the type of activities that will be

conducted within the community of practice. It is important to remember that the technology does not make the VCoP; it is the activities of the members, their interactions with each other, as they learn and grow together. As discussed by Nonaka,

The process of organizational knowledge creation is initiated by the enlargement of an individual's knowledge within an organization. The interaction between knowledge of experience and rationality enables individuals to build their own perspectives on the world. Yet these perspectives remain personal unless they are articulated and amplified through social interaction. One way to implement the management of organizational knowledge creation is to create a "field" or "self-organizing team" in which individual members collaborate to create a new concept.<sup>27</sup> Nonaka went on to point out that,

Tacit knowledge may be transformed into explicit knowledge by (1) recognizing contradictions through metaphor, and (2) resolving them through analogy. Explicit knowledge represents a model within which contradictions are resolved and concepts become transferable through consistent and systematic logic.<sup>28</sup>

Selecting the right technologies is important so that organizational members can participate in an atmosphere that is engaging and focuses on collaboration. Through their exchanges the tacit knowledge of members has the potential to be converted to explicit knowledge and codified. Using the right technology to this end can facilitate and support the communities' efforts; however it is still the member's activities and passions that will define the VCoP and to what extent the knowledge within will be codified for future organizational use.

There are many web-based technologies that can facilitate VCoP. Some of the technologies used widely include, but are not limited to: email lists (aka. list serve), blogs, chat, discussion board, instant messaging, member directory, polling, presence indicator, tags, teleconferencing, and wikis.<sup>29</sup> Each of these technologies has pros and cons associated with their usage within a VCoP. The technology deployed and its effectiveness will be partially dependent on the type of community of practice it is to be used by.

---

<sup>27</sup> Nonaka, "A Dynamic Theory," 22.

<sup>28</sup> Ibid., 21.

<sup>29</sup> John Smith, et al., "Tools for Communities Wiki," Tikiwiki, <http://technologyforcommunities.com/tools/tiki-print.php?page=HomePage>.

## **II. TECHNOLOGY SYSTEMS THAT SUPPORT VIRTUAL COMMUNITIES OF PRACTICE**

In order to discuss the impact that a VCoP has in the overall sharing of explicit and tacit knowledge and whether or not the exchanges within a VCoP lead to organizational memory, an understanding of the associated technologies is important and relevant. The following is a brief highlight of the Web 2.0 technologies that are used to support VCoP. Although this is a good sample of the technologies used to support VCoP, it should not be considered an all inclusive listing.

### **A. EMAIL LISTS**

Email lists, commonly referred to as list serves, are a popular way for communities of users to exchange information. List serves have been widely used for many years. They function by allowing an authorized user to create and send an email to the list email address, and the list serve software then distributes the email message to all members of the list serve. It is a powerful tool for both group discussions and for announcements to a community of users. List serves can be configured so that everybody in the community can send messages or restricted to only allow specified users with verified privileges to send messages.

In today's environment email, technology is widely accepted and used. List serve technology allows for a low-cost and reliable means for group discussions. The technology is easy to administer and offers mechanisms for the archiving of group messages for later review. These archives allow users to search past discussions which enable users to benefit from discussions that they might not have been personally involved with at the time of the original postings.

### **B. BLOGS**

Blogs can be considered as a collaborative work space hosted via a web page on the Internet. A blog is only limited by the creator and community's collective imagination. Blogs are used as a way to share thoughts and ideas within a community of

users. According to Blogger.com, “In simple terms, a blog is a web site, where you write stuff on an ongoing basis. New stuff shows up at the top, so your visitors can read what's new. Then they comment on it or link to it or email you. Or not.”<sup>30</sup> Blogging should be considered more than posting individual comments on a web page. It should be thought of as having the potential for creating a collaborative environment where a community of users can share their thoughts and through communication and discourse knowledge can be shared and created.

### **C. CHAT**

In an online environment chat is the term used to refer to synchronous communications. In an online chat environment this would be communication where two or more users interact with each other via written communication in a virtual environment, commonly referred to as a chat room. Chat rooms can be public, where numerous users simultaneously participate, or they can be restricted to private communications between selected users. Similar to email, technologies that support chat have been widely used for some time. Popular chat applications include Internet Relay Chat (IRC), Yahoo’s messenger, America Online’s Instant Messenger, Google’s Talk, and Skype. Chat technologies offer some benefit to users when it comes to documenting conversations, for example, discussion notes for future meetings. Chat technologies generally enable a user to log the chat conversation. The conversation can then be used for later reference or forwarded to other users.

### **D. DISCUSSION BOARD**

Discussion boards are commonly referred to as “forums” and are used for asynchronous communications.<sup>31</sup> This technology allows for open ended communications in written format. A user can start a discussion by adding a posting to a community forum. Other users from the community can read and add comments to the original posting, opening up a group dialog. Discussions are stored and can be referenced

---

<sup>30</sup> Blogger.com, "What's a Blog?" Google. <http://www.blogger.com>.

<sup>31</sup> John Smith et al., "Tools for Communities."

by new users of the community or viewed later for community reference. According to John D. Smith et al., “Whereas Blogs focus on the voice of a member, discussion boards focus on topics of communal interest.”<sup>32</sup> Smith et al., has pointed to some key features of discussion boards as it relates to communities of practices. They include, the ability to start or reply to a thread, ability to add attachments and inline images, discussion cross-links, discussion labels, message type labels, the ability to post private responses, view discussions in a threaded or linear style, sort messages dynamically, and if a user desires, integrate into a user’s email system (users have the ability to receive emails of community postings.)<sup>33</sup>

## **E. INSTANT MESSAGING**

Instant messaging allows computer users to interact with other computer users using technology very similar to that described in the chat section above. Users generally use chat for more lengthy conversations and instant messaging for more to the point and brief communications. Instant messaging, like chat, can be accessed from most computers and the instant messaging systems can detect the presence of online community users. This technology enables users to ask and respond to brief inquiry’s fostering an atmosphere of collaboration. According to John D. Smith et al., “Instant Messages can be a great way of providing help and of expressing reciprocity within a community. Instant messages can be a key back-channel means of communication that is indispensable, especially for leaders and facilitators.”<sup>34</sup> Smith et al., pointed out how many features of instant messaging technologies can be utilized within communities of practice. These features include the ability to open a session, post and read messages, add participants, and see as other users are typing, user presence indicators, logging and message history can be activated, as well as the ability to support various protocols.<sup>35</sup>

---

<sup>32</sup> John Smith et al., "Tools for Communities."

<sup>33</sup> Ibid.

<sup>34</sup> John Smith et al., "Instant Messaging," Tikiwiki, (2007)  
<http://technologyforcommunities.com/tools/tiki-index.php?page=Instant+messaging>.

<sup>35</sup> Ibid.

## **F. MEMBER DIRECTORY**

A member directory is a useful feature for listing community members. Information about users can be posted, and users are encouraged to put information about their interests. Contact information, personal information, and even photographs of users can be posted for others in the community to see. Groups and sub-groups can be created based on similar interests. According to John D. Smith et al., as it relates to communities of practice,

A community that grows beyond a few dozen people needs a roster of members. As people join and leave, members need to be able to keep track of who currently consider themselves members. Having a directory that is specific to a community also makes it possible to use "local" terminology that makes sense only inside the community. Members may share information about themselves inside the community space that they would not want shared outside.<sup>36</sup>

## **G. MICROSOFT SHAREPOINT TECHNOLOGIES**

Microsoft SharePoint is a server based software package that enables users to use many Web 2.0 technologies. Through Microsoft's built-in templates or user created templates web sites for collaboration can be easily designed and deployed. Some of the built in features include, forums, discussion boards, custom lists, calendar, to-do lists, wiki technology, email notifications, as well as many other useful features. One of the key benefits that Microsoft SharePoint offers is that it enables information technology departments to deploy this technology with minimal support. Information technology administrators can assign a business unit leader to be the administrator for their component of the SharePoint. This allows the site administrator from that business unit to control all aspects of their SharePoint. They can control the design and style as well as user access permissions. They can design their site to best meet their needs and in a way that supports collaboration and knowledge sharing.

---

<sup>36</sup> John Smith et al., "Member Directory," Tikiwiki, <http://technologyforcommunities.com/tools/tiki-index.php?page=Member+directory>.

## **H. MISCELLANEOUS SUPPORTING TECHNOLOGIES**

There are many technologies that add to the community's functionality and add to the overall experience a user has. Listed below are some of the ancillary functions that provide usefulness to communities of practice.

### **1. Polling**

Polling, commonly referred to as an online survey, is a tool that can be used by a community to help in gathering information for analysis, to assist in decision-making processes, and to assist in the evaluation of collected information.<sup>37</sup>

### **2. Presence Indicators**

Presence indicators allow users to share their online status with other users. Primarily used with instant messaging and chat features, presence indicators allow users of a community to know when members, who are online, are available for interactions. Users can program various online status modes, for example, online, available, away from computer, busy, and not available. According to John D. Smith et al.,

A presence indicator makes the activity level in a community more visible and increases access to colleagues, while limiting possible distraction from non-colleagues. Having a feeling of 'company' is extremely important to some communities and some people. A presence indicator is an excellent stimulus to contacting someone with whom to bounce ideas in the community. Presence indicators are also useful to getting organized for synchronous events such as a phone call or chat. We have found that it is not very useful to be able to see who else is online unless participants are also able to easily contact the people they see online.<sup>38</sup>

---

37 John Smith et al., "Polling," Tikiwiki,(2006) <http://technologyforcommunities.com/tools/tiki-index.php?page=Polling>.

38 John Smith et al., "Presence Indicator," (2006) <http://technologyforcommunities.com/tools/tiki-index.php?page=Presence+Indicator>.



There are several features associated with presence indicators that Smith et al., highlighted. They pointed to the manual definition of presence, individual buddy lists and black lists, and the ability to set presence indicators based on the type of activity a user is engaged in.<sup>39</sup>

### **3. Tags**

Tagging refers to the ability to attach key words to technology components. For example, one can attach numerous keywords that describe the content of a webpage or web component to that page or component. By doing so, other users can query based on those key words and the “tagged” items will be located. This type of tagging helps users describe content so that other users can quickly locate the material either by query results or by browsing by key word groups.<sup>40</sup>

### **4. Behavioral Parameters**

Behavioral parameters can be referred to as a user rating system. Rating systems allow community users to score other user’s contributions to the community. This can foster an environment where desired behaviors rise and are rewarded simultaneously building a user’s reputation within the community.<sup>41</sup>

---

<sup>39</sup> John Smith et al., "Presence Indicator," (2006) <http://technologyforcommunities.com/tools/tiki-index.php?page=Presence+Indicator>.

<sup>40</sup> John Smith et al., "Tags," Tikiwiki, <http://technologyforcommunities.com/tools/tiki-index.php?page=Tags>.

<sup>41</sup> John Smith et al., "Behavioral Parameters," Tikiwiki, <http://technologyforcommunities.com/tools/tiki-index.php?page=Behavioral+Parameters>.

### III. METHODOLOGY

This research seeks to answer the question whether the sharing of data, information, and knowledge in a law enforcement and intelligence focused virtual community helps transfer tacit knowledge and mitigate the loss of organizational memory. This research will look at the information available in various online law enforcement and intelligence related virtual communities to determine if these communities and the systems that allow them to transfer tacit knowledge and to better share and store explicit knowledge and mitigate the loss of organizational memory. Information was gathered from interviews with personnel utilizing law enforcement related VCoP, from observation, including participant observation of law enforcement related VCoP, as well as from a review of the literature available.

Specifically this research explored whether or not collaborative technologies in place to support information and knowledge sharing within virtual communities housed within intelligence and fusion centers mitigate the loss of organizational memory, and whether they better enable senior level officers and analysts to transfer tacit knowledge to new officers and analysts just entering the intelligence / fusion center.

The research methodology used in this thesis project was the case study approach. The case study approach was chosen because the type of data to be collected and analyzed is most suited to being captured by this approach. Examining the transfer of tacit knowledge, and how it might be codified into explicit knowledge, required examining exchanges in the real-life environments of these VCoP. Much of the tacit knowledge exchanged in these environments is contained within the context of the user's online interactions and exchanges. According to Robert K. Yin, in his book *Case Study Research: Design and Methods*, a case study can be described as:

1. A case study is an empirical inquiry that (a) investigates a contemporary phenomenon within its real-life context, especially when (b) the boundaries between phenomenon and context are not clearly evident. In other words, you would use the case study method because you deliberately wanted to cover contextual conditions.<sup>42</sup>
2. The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result (a) relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result (b) benefits from the prior development of theoretical propositions to guide data collection and analysis.  
In other words, the case study as a research strategy comprises an all-encompassing method – covering the logic of design, data collection techniques, and specific approaches to data analysis. In this sense, the case study is not either a data collection tactic or merely a design feature alone but a comprehensive research strategy.<sup>43</sup>

The three cases that were explored in this research are real world examples of virtual communities that leverage collaborative technologies implemented to support information sharing and knowledge transfer within law enforcement and intelligence environments. These cases offer a valuable look into the real-life uses of these collaborative technologies and how the members of these virtual communities may benefit from the codification of information and transfer to tacit knowledge that occurs within them. Each case is unique in some respects, yet similar in its use of the underlying collaborative technologies and member composition. Choosing these three cases provided a means to identify similar and dissimilar codification and transfer mechanisms that support the transfer of explicit and tacit knowledge. Evaluating and looking for these patterns within the data resulted in a quality analysis.

A qualitative analysis of messages, postings, and conversations contained within the VCoP was used to identify the transfer of both explicit and tacit knowledge. By analyzing the context and depth of interactions between senior and junior members within the VCoP, this thesis explored whether the transfer of tacit knowledge is occurring and whether this transfer mitigates the loss of organizational memory.

---

<sup>42</sup> Robert K. Yin, *Case Study Research: Design and Methods*, 3rd ed. (Thousand Oaks, CA: Sage Publications Inc, 2003), 13.

<sup>43</sup> *Ibid.*, 14.

#### **A. MIAMI POLICE DEPARTMENT'S USE OF SHAREPOINT TECHNOLOGY WITHIN THEIR TRAINING UNIT**

The Miami Police Department's Training Unit is using Microsoft's SharePoint technology to host a VCoP. The training unit's training staff, consisting of twenty-nine sworn and civilian personnel, have been using SharePoint technology in a VCoP setting for approximately one year in order to facilitate collaborative knowledge sharing efforts. The police academy staff's use of the VCoP were the primary area of focus and data collection methods varied. Data collection was based on interviews, VCoP participant observer observations, and information stored within the VCoP.

The analysis of the Miami Police Department's use of Microsoft SharePoint technologies to support the sharing and transfer of explicit / tacit knowledge within the VCoP was based on the author's role as a participant observer. This researcher implemented a pilot VCoP within the training unit of the Miami Police Department. Although there are some caveats to the participant observer role, every effort to minimize unnecessary bias was made. Some of the caveats mentioned by Robert K. Yin included the potential of the observer becoming biased because at times the participant-observer may have to assume a role or take a position as an advocate. Normally, this would be contrary to good scientific practice. Additionally, Yin pointed out that the participant-observer can become a supporter of the organization being studied, if this is not already the case.<sup>44</sup> As pointed out by Robert K. Yin,

Participant-observation is a special mode of observation in which you are not merely a passive observer. Instead you may assume a variety of roles within a case study situation and may actually participate in the events being studied. The participant-observation technique has been most frequently used in anthropological studies of different cultural or social groups. The technique also can be used in more everyday settings, such as a large organization or informal groups.<sup>45</sup>

---

<sup>44</sup> Yin, *Case Study Research*, 96.

<sup>45</sup> Ibid., 93.

## **B. INTERNATIONAL ASSOCIATION OF COMPUTER INVESTIGATIVE SPECIALISTS (IACIS)**

The International Association of Computer Investigative Specialists is a non-profit volunteer organization that was founded in 1990. The organization was created to offer training and certification in the field of electronic evidence collection and processing. Over the years since its founding a community of practice developed amongst students and practitioners. With the increased availability of technology, the community of practice grew into a thriving VCoP. Through the sharing of tacit computer forensic related knowledge, as well as learned experiences, students and members began to develop more explicit computer forensic knowledge. Data collection for this thesis was based on interviews, VCoP observations, and information stored within the VCoP. The analysis of the IACIS VCoP was made by reviewing archival records in the form of forum postings and emails, direct observation of member exchanges via electronic format, and by interviewing community members.

## **C. NEW JERSEY REGIONAL OPERATIONS AND INTELLIGENCE CENTER (ROIC) TASK FORCE**

The New Jersey Regional Operations and Intelligence Center (ROIC), commonly referred to as the “rock” within the law enforcement intelligence community, was established in January 2005.<sup>46</sup> The mission of the ROIC is

To collect, analyze, and disseminate intelligence to participating law enforcement entities; evaluate intelligence for reliability and validity; provide intelligence support to tactical and strategic planning; evaluate intelligence in the Statewide Intelligence Management System; and disseminate terrorism-related activity and information to the Federal Bureau of Investigation, among others. ROIC is also the home of the State Emergency Operations Center, the State Office of Emergency Management, and the State Police Emergency Management Section Offices.<sup>47</sup>

---

<sup>46</sup> GAO, “Homeland Security.”

<sup>47</sup> Ibid. 87.

One of the concepts was to bring intelligence from many sources into one location to be processed and analyzed and, in turn, to provide an intelligence product that is more than just the sum of its individual inputs. The intent was to create an environment where collaboration and information sharing prevails. The ROIC is comprised of three core functions:

(1) an analysis component, responsible for collecting, analyzing, and disseminating intelligence information entered into the Statewide Intelligence Management System by local, county, state, and federal law enforcement; (2) the operations component, which will control the actions of State Police operational and support personnel and serve as a liaison to federal agencies, other state entities, and county or municipal agencies on operational matters; and (3) a call center component, which will provide the center with situational awareness intelligence about emergency situations.<sup>48</sup>

Data collection for this research was focused on data from within the analytical unit of the ROIC, currently led by Lt. Raymond Guidetti of the New Jersey State Police. Data collection was based on interviews, VCoP observations, and information stored within the VCoP.

The analysis of the ROIC VCoP was made by interviewing the VCoP champion and community member Lieutenant Raymond Guidetti. Additionally, a review of archival records in the form of forum postings and direct observation of member exchanges via electronic format was also made.

Interviews were conducted with selected case study community members and VCoP champions. The interviews were unstructured, open-ended, and were more geared towards “guided conversations.”<sup>49</sup> Interviewees were asked about facts regarding their respective VCoP, their participation, as well as opinions they may hold regarding their VCoP usage.

---

<sup>48</sup> GAO, “Homeland Security.”

<sup>49</sup> Yin, *Case Study Research*, 89.

It should be noted, according to Robert K. Yin, there are four tests that are “commonly used to establish the quality of any empirical social research.”<sup>50</sup> These four tests are summarized below as excerpted from his text,

**Construct validity:** establishing correct operational measures for the concepts being studied.

**Internal validity:** establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships.

**External validity:** establishing the domain to which a study’s findings can be generalized.

**Reliability:** demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results.<sup>51</sup>

Construct validity is important and can be increased by “using multiple sources of evidence.”<sup>52</sup> This research evaluated three distinct cases: the Miami Police Department’s use of Microsoft SharePoint technology to build a VCoP, the International Association of Computer Investigative Specialists VCoP, and the New Jersey’s ROIC VCoP. By evaluating these three cases, a comparative analysis of the data and convergent lines of inquiry was explored.

Internal validity can be a concern when conducting research dealing with causal or explanatory case studies.<sup>53</sup> There are several approaches that can offset the threat to the internal validity of a case. There are at least three analytic tactics that were used in this research to address concerns with the internal validity: pattern matching, explanation building, addressing rival explanations, and using logic models.

The problem of external validity deals with whether or not a case study’s findings can be generalized. According to Robert K. Yin,

---

<sup>50</sup> Yin, Case Study Research, 33.

<sup>51</sup> Ibid., 34.

<sup>52</sup> Ibid., 36.

<sup>53</sup> Ibid.

Critics [of case studies] typically state that single cases offer a poor basis for generalizing. However, such critics are implicitly contrasting the situation to survey research, in which a sample readily generalizes to a larger universe. This analogy to samples and universes is incorrect when dealing with case studies. Survey research relies on statistical generalization, whereas case studies rely on analytic generalization. In analytic generalization, the investigator is striving to generalize a particular set of results to some broader theory.<sup>54</sup>

By using a multiple case study approach it is more likely that this research will have external validity and be generalized beyond these immediate cases.

Reliability is a key component in any case study. Data reviewed and interviews conducted were documented by the researcher. Every effort to reduce biases was made, and an objective analysis was performed.

Organizations have used technology to facilitate communications between their employees for many years now. The growing popularity of Web 2.0 technologies, along with their ease of use, has led companies to implement technologies that assist their employees in communication and with the sharing of information and knowledge. The next chapter will look at data from three law enforcement related organizations that developed techniques to use technology to support their communities of practice. The first is the Miami Police Department's use of Microsoft SharePoint technology within their training unit. The second is the International Association of Computer Investigative Specialists' (IACIS) use of information technology to support communications between their members. The third is the New Jersey Regional Operations and Intelligence Center (ROIC) Task Force's use of Web 2.0 technologies to support their VCoP.

---

<sup>54</sup> Yin, *Case Study Research*, 37.



THIS PAGE INTENTIONALLY LEFT BLANK

## **IV. LAW ENFORCEMENT'S USE OF VIRTUAL COMMUNITIES OF PRACTICE**

The three cases outlined in the following pages are good examples of law enforcement's use of VCoP. The first case that will be discussed is the Miami Police Department's use of Microsoft SharePoint technology within their training unit. The thesis will examine how the training unit created a pilot VCoP to enable training staff members to share both explicit and tacit knowledge in an attempt to become more efficient and to see if their efforts mitigated the loss of organizational memory. The second case is the International Association of Computer Investigative Specialists' (IACIS) use of information technology to support communications between their members. Throughout the years since this association was formed, a strong CoP was built and eventually evolved into a VCoP. This association's use of its VCoP to share explicit and tacit knowledge in a technically oriented law enforcement field added to the content of this analysis. Lastly, the third case is the New Jersey Regional Operations and Intelligence Center (ROIC) Task Force's use of Web 2.0 technologies to support its VCoP. This environment is law enforcement related but more specialized in the intelligence arena. In this arena the sharing of information and knowledge is essential.

### **A. MIAMI POLICE DEPARTMENT'S USE OF SHAREPOINT TECHNOLOGY WITHIN ITS TRAINING UNIT**

Many local law enforcement agencies have recently been faced with a large attrition rate. The Miami Police Department is no exception. During the last couple of years the police department has lost large numbers of officers. This has required recruiting significant numbers of officers to fill these voids. Once hired, these new police recruits must be indoctrinated into the Miami Police Department's culture and be trained in policing philosophy and techniques. The training delivered is based on the state of Florida's Criminal Justice Standards and Training Commission's Basic Recruit Curriculum. The training consists of a two week pre-orientation phase, six month basic recruit training phase, four week post-orientation phase, and finally a field training phase.

During these training phases the police recruits are closely monitored by senior police officers assigned to the training unit. These officers are assigned on a full time basis and designated as Police Academy Training Advisors (TA). Due to the large number of police recruits being trained there are currently five training advisors and two training supervisors assigned to the Police Academy function.

The training advisors have many critical responsibilities. One of their important assignments is to ensure a thorough and proper documentation of all activities relating to each recruit and sharing information about recruits with each other and their superiors. Although the training advisors work in a team environment, the nature of their responsibilities makes collaboration amongst themselves a challenge.

Currently the documentation efforts are completed using a legacy paper based system. This meets the minimum needs of documentation but does not lend itself to a collaborative environment. Oftentimes a sole TA will interact with a police recruit regarding an incident that dictates documentation. The TA would then be responsible for preparing a memorandum to file detailing the circumstances. In a perfect world the TA would share this information with the other training advisors and the training supervisors so that they could all be aware of the well-being of the various recruits. Additionally, they could discuss the approach used to handle the situation and together develop “lessons learned.” Unfortunately, the TAs do not always have the opportunity to brief each one another on all interactions. Additionally, in order to maintain adequate training staffing coverage not all TAs work at the same time. There are several ways to brief each other to include, team briefing meetings, making copies of the memorandums and distributing them to each TA, individually brief each other as time permits, as well as many others. All these methods are effective, but this author would argue not the most efficient given today’s vast technological resources.

The type of legacy documentation described above does not carry forward with the recruit in any meaningful way. At the end of the Basic Recruit Training program the file is stored and not reviewed again unless the recruit has significant problems in the field training phase or later. A pilot project to create an online collaborative environment, where explicit knowledge could be shared and codified by the training staff as well as the

sharing of tacit knowledge, was proposed. By initiating an online collaborative environment amongst the TAs, several efficiencies were expected to be gained as well as a significant value added to both the Miami Police Department and the training received by the police recruits. By creating an online collaborative environment using readily available Web 2.0 technology, the TAs would be able to increase their information sharing and collaborative efforts. It was hoped that tacit knowledge exchange would occur between TAs and supervisors during the online exchanges and that organizational memory would be increased.

In August of 2007 the Miami Police Department's Training Unit took advantage of the department's recent implementation of Microsoft's SharePoint technology (see Figure 1). The concept was to use SharePoint technologies to create a VCoP consisting of the department's training staff of twenty-nine. The pilot program was designed to test the technology initially at the off-site police academy location.



Figure 1. What is a SharePoint Server?<sup>55</sup>

---

<sup>55</sup> Microsoft.com, "What Is Microsoft Office Sharepoint Server?" (2007)  
<http://www.microsoft.com/sharepoint/prodinfo/what.mspx>.

The pilot program was to test the use of the SharePoint technology and to determine: if its use would be effective, if its use would increase administrative efficiency, if its use would increase the sharing of information and knowledge between organization members, and to see if a VCoP would develop amongst the users.

As mentioned in previous sections, there are many Web 2.0 technologies available to facilitate collaborative efforts. For the initial purposes of the pilot program, the implementation and evaluation of an enhanced discussion board feature supported by a backend Microsoft SharePoint server was proposed. There are many software manufactures that have online discussion boards and forum software products that can be used for this type of need. It was decided that Microsoft SharePoint server would be used because it is robust, readily available in the Miami Police Department environment, not complicated to train personnel, and easy to use and manage.

In order to initiate this pilot project, several technology requirements had to be installed and available. As the police academy is located at an offsite facility, a network infrastructure had to be in place for communications to the Miami Police Department's network. For the client-side communications, the police academy currently had high speed Wide Area Network (WAN) access to the Internet. On the server side, the Miami Police Department has high speed WAN access to the Internet. In this case the VCoP communications were primarily to take place through the existing WAN environments using secure Virtual Private Network (VPN) technologies.

With the network infrastructure tested, available, and in place this pilot project needed a server side technology to host the online collaboration site. This project utilized the Microsoft SharePoint Server environment. There are several reasons for this. First and foremost, the technology was recently installed within the Miami Police Department's network and therefore was available for use with no additional costs. The SharePoint technology is also scalable and robust enough to handle the needs of this project. The software is relatively easy to implement, and security and permissions can be handled locally by the end user administrator versus the Miami Police Department's network administrators. Backups and off-site backups are maintained by the Miami Police Department's Information Technology Support Section (ITSS).

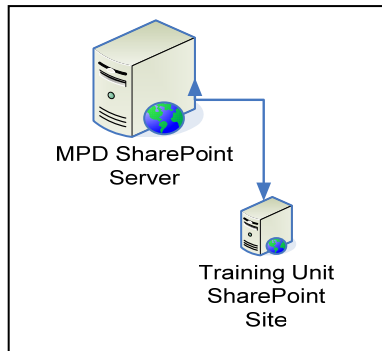


Figure 2. SharePoint Server

To enable this pilot project the ITSS created a “Training Unit” SharePoint. This is a virtual environment allowing an end user administrator to manage all aspects of the training unit SharePoint site. This has added benefit to the organization because it significantly reduces the ITSS resources needed to manage the site. By giving a local end user the ability to administer their SharePoint, content can be rapidly changed, users added, permissions changed, as well as the many other administrative functions of the site can be manipulated with minimum ITSS assistance. This allowed the ITSS to focus on more strategic missions rather than mere technical support.

The client side needed technology equipment as well. To facilitate communication to the SharePoint server, each TA was issued a Miami Police Department laptop capable of VPN access back to the Miami Police Department’s network and SharePoint sites. To make the end user TA’s use as simple as possible, they were issued laptops configured to access the Intranet through the WAN VPN. Once connected, they were able to use their Internet browser to navigate to the training unit’s SharePoint site. Because the technology is web-based, access speeds are sufficient for a well received user experience. Once at the training unit’s SharePoint site, many functions could be performed.

There are two services within the training unit’s SharePoint site that were focused on during this pilot project. These services were evaluated for their use and effectiveness as it relates to this collaborative effort. The services that were chosen for focus were the discussion board service and the custom list service.

## 1. Option A: Discussion Board Service

A discussion board was setup per recruit class. The discussion board consisted of several fields, which included:

- ***Date of Entry:*** Used to document the date of entry posting. This field is auto-generated.
- ***Created by:*** Used to document who posted, this field is auto generated and is set by the logged in user account.
- ***Subject:*** Used to document the encounter with the TA. This field data is entered by the various TAs.
- ***Category:*** Used to document the type of encounter. This field will be used for filtering reports based on types.
- ***Attachment:*** The TA will have the ability to attach documents to the postings. For example, a recruit may be required to respond via memorandum to an incident. In this case, the recruit's memorandum will be scanned and attached to the posting.

Each recruit within the class was given one discussion thread. All contacts and observations were to be posted under that recruit's thread. All the documentation related to a specific recruit will be encapsulated under this thread.

## 2. Option B: Custom List Service

A custom list service will be setup per recruit class. The custom list will have several fields including:

- ***Recruit Name:*** This field will be a drop down listing available recruit names.
- ***Date of Entry:*** Used to document the date of entry posting. This field is auto generated.
- ***Created by:*** Used to document who posted, set by logged in user account.
- ***Subject:*** Used to document the encounter with the TA. This field data is entered by the various TAs.
- ***Category:*** Used to document the type of encounter. This field will be used for filtering reports based on types.

- ***Attachment:*** The TA will have the ability to attach documents to the postings. For example, a recruit may be required to respond via memorandum to an incident. In this case, the recruit's memorandum will be scanned and attached to the posting.

All contacts and observations were to be posted under this custom list area. By applying a filter to the web-based view, training advisors would be able to see all contacts for a given recruit. The documentation related to all recruits for a given recruit class was encapsulated under one custom list service.

Both of these services will essentially provide the same utility for the TAs to collaborate and share information. The only difference will be the visual preference for the end users and ease of reporting functionality. Initially the first basic recruit class will use the discussion board option. The next basic recruit training class to start will then use the custom list option. The two options will then be compared for functionality, ease of use, reporting, etc.

Having briefly discussed the technology components that needed to be in place, it is time to outline the collaborative workflow the TAs went through. All TAs were initially given a training session on how to utilize the training unit's SharePoint site. The TAs were shown how to setup the site to auto notify each of them when a posting was made by using a feature called "alert me." This feature enables the SharePoint server to automatically send an email notification to each TA when any items are added or changed. The concept was as follows; first, a TA has an encounter with a recruit. For this example, a recruit lost a piece of city-issued equipment. In this scenario the TA would have the recruit provide a memorandum documenting the circumstances. Using his or her assigned laptop the TA would use the Internet browser to access the SharePoint discussion board. He or she would access that particular recruit's thread. The TA would then enter a brief description of circumstances and any recommendations.



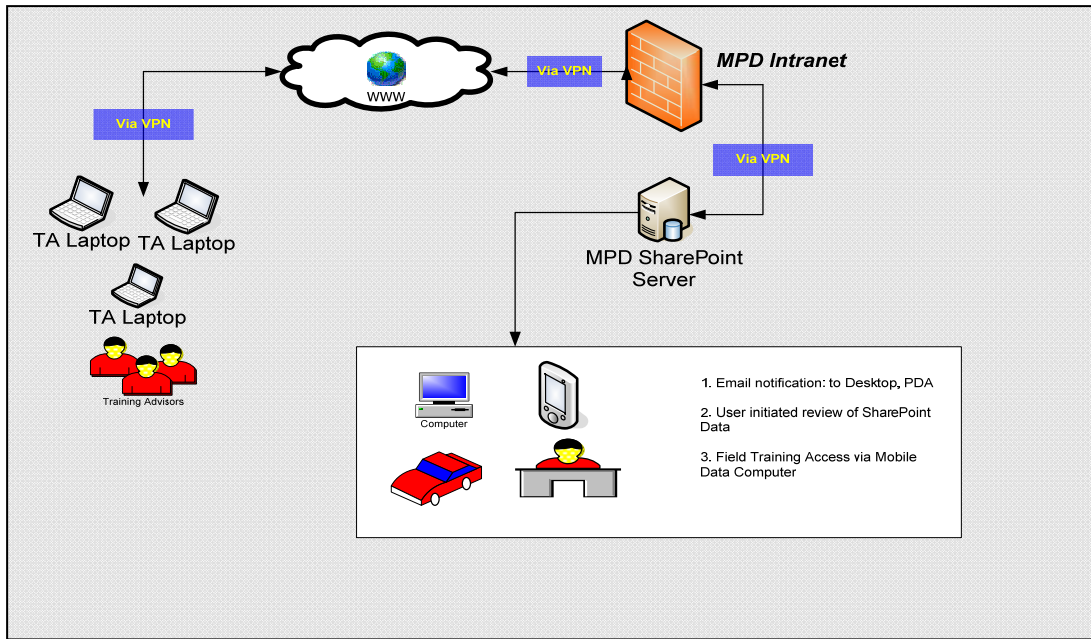


Figure 3. Sample Setup

The TA would attach the scanned version of the recruit's response memorandum. The TA would then select what categories this encounter applies to from the option boxes. This posting would then be automatically emailed to all the TAs, as well as the TA supervisors and the training unit commander.

The basic recruit phases encompass approximately eight months. During this time frame, each TA would make entries similar to the above example. As more and more encounters are entered and categorized, it would help each TA see behavioral trends of recruits that need to be addressed. TAs could share how they handled various situations and together come up with best practices. These best practices can be thought of as explicit knowledge which would be codified and used later by new TAs. Additionally, it is hoped that the experienced based discussions that occur between TAs and through these exchanges of tacit knowledge would be shared. It should also be noted that TA supervisors will have the ability to create ad hoc reports based on recruit, category, discussions, as well as other options.

Initially, it is anticipated that this type of virtual sharing of information between TAs will be far greater than the communication that is in existence today. As entries are

made each TA will get a copy emailed to them. Additionally, the TA supervisor and the training unit commander will be emailed copies. This saves the TA time of having to draft a memo to file and provide copies to his/her chain of command. The automatic notification will perform this function. These notifications also provide enhanced awareness of recruit training trends and issues. In the past, when an incident of significance occurred involving a recruit, a TA would have to manually put together a history profile. In order to do this, a TA would go through the legacy files and make copies to provide to the chain of command. With this now being in an online format, the TA only needs to print the recruit's history from the SharePoint, saving time and manpower hours. Upon completion of the basic recruit training program, this SharePoint data can be made available to the field training program staff. This history data can then be referenced for enhanced individual training. A field training supervisor can now review this data and be proactive in training delivery needs. This data can then be archived for future reference.

### **3. User Demographic**

It is important to briefly discuss the VCoP's user demographics because these factors can contribute to participation, the building of social trust, and the overall use of the VCoP. As pointed out by C. Kimble, "in a CoP, legitimization comes from social relationships that develop. As members get to know each other, they are better able to judge the information they receive from their partners. This shows the human aspect of a CoP to be of major importance."<sup>56</sup> The Miami Police Department's Training Unit is comprised of twenty-nine sworn, civilian personnel. Out of the twenty-nine, the unit primarily consists of sworn personnel and has the support of five civilians. These members come from diverse backgrounds and are both male and female. There is a varying level of technology based ability from the advanced computer user to the novice. They primarily work between two geographically separate locations: police headquarters and the Police Academy. Their duties also require them to perform field activities that

---

<sup>56</sup> Chris Kimble, Paul Hildreth, and Peter Wright, "Communities of Practice: Going Virtual," in *Knowledge Management and Business Model Innovation*, ed. Malhotra Yogesh, 230 (Hershey, PA: Idea Publishing Group, 2001).

take them away from the office frequently. Each has access to laptop computers. Their primary job responsibilities are to provide safe quality training and education to police recruits. They are required to maintain proper documentation of events throughout the training process.

#### **4. Types of Technology Used by the Miami Police Department's Training Unit to Facilitate Their VCoP**

The Miami Police Department's Information Technology Support Section implemented Microsoft SharePoint services for use by departmental business units. The department's training unit used SharePoint technologies to create a VCoP within the training unit. The primary SharePoint technology used was discussion boards, custom list service, and the use of email via the SharePoint "alert me" features. Other SharePoint features were also reviewed; those include: wiki technologies, task management technologies, calendar events, and the use of survey technologies.

#### **B. INTERNATIONAL ASSOCIATION OF COMPUTER INVESTIGATIVE SPECIALISTS (IACIS)**

The International Association of Computer Investigative Specialists is a non-profit volunteer organization that was founded in 1990. The organization was created to offer training and certification in the field of electronic evidence collection and processing. In the early 1990s, personal computers were just starting to become a common household item. Along with the increase in personal computer use, came those in society that used the computers for illegal acts. In response, the law enforcement community realized that it needed its officers to be trained in the proper techniques for electronic evidence collection and processing. The founders of the IACIS organization, in turn, developed a training and certification concept. The training concept revolved around the idea that law enforcement students would be provided basic computer forensic training during an annual two-week conference. The conference would be taught by an all volunteer instructor force comprised of individuals who had already successfully completed the certification process. The current basic computer forensics class has evolved since its inception, and it has remained a challenging two weeks of intense

training. Following the initial training, the concept was to have the new students mentored by those who had already successfully completed the certification program. The initial goal of the mentoring process was to have students work through six computer forensic related problems. Each problem increased in difficulty, and students could not proceed if they failed a problem. To obtain certification as a Certified Forensic Computer Examiner (CFCE), a student was required to successfully pass all problems and pass a final examination. Over the years this certification process has become widely respected internationally and is a certification that is sought after by those seeking a career in computer forensics.

A community of practice soon developed amongst these students and practitioners. This author is not sure if the community developed by conscious design or out of necessity of the students. Through the mentoring process relationships developed. Due to the highly technical and complex nature of the problems faced, the students were encouraged and expected to seek help and guidance. The field of computer forensics was a new area of practice at the time and when procedural and technical questions would arise, the examiners would reach out to each other for assistance. Through the sharing of tacit computer forensic related knowledge, as well as learned experiences, students and members began to develop more explicit computer forensic knowledge.

IACIS has grown and evolved over the years since its creation. It is now an international organization with members from around the world. According to the president of the organization, Scott Turner, "our membership includes federal, state, and local law enforcement personnel from the United States, and international law enforcement personnel from nearly 50 additional countries around the world."<sup>57</sup> IACIS continues to hold annual training events where law enforcement and government officials can come for basic and advanced training in electronic evidence collection and processing. As demonstrated in the following excerpt from a 1994 IACIS newsletter, one of the unique components that the founders of IACIS have instilled in its membership is the sense of community and spirit of helping each other:

---

<sup>57</sup> Scott Turner, "President's Message," International Association of Computer Investigative Specialists, [http://www.iacis.com/home/presidents\\_message](http://www.iacis.com/home/presidents_message).

The IACIS trained investigator is a law enforcement officer or support person. They represent state, local, and federal agencies in the United States and many other countries *The IACIS investigator has the support of all IACIS members through the use of the IACIS BBS, the IACIS Newsletter, and networking with IACIS members. No matter what type of problem you may have in a seizure or an examination, help is just a phone call away.[italics added]*<sup>58</sup>

## **1. User Demographic**

It is important to briefly discuss the VCoP's user demographics because these factors can contribute to participation, the building of social trust, and the overall use of the VCoP. As pointed out by C. Kimble, "in a CoP, legitimization comes from social relationships that develop. As members get to know each other, they are better able to judge the information they receive from their partners. This shows the human aspect of a CoP to be of major importance."<sup>59</sup> IACIS is comprised of mostly law enforcement sworn and civilian personnel with the primary responsibility for conducting electronic evidence collection and processing. Their membership includes federal, state, and local officials as well as officials from many other countries. There are currently 1249 active IACIS members worldwide. Out of those, there are currently 673 actively certified members (Certified Forensic Computer Examiners).<sup>60</sup> Membership includes male and female, sworn and civilian, who work and reside throughout the United States and abroad.

## **2. Types of Technology Used by IACIS to Facilitate VCoP**

Since its inception, IACIS directors have worked to build a sense of community among its membership. In the early days of the 1990's, collaborative technologies were limited as compared to what is widely available at the time of this writing. Even with these early limitations IACIS members were able to form a community of practice. The formation started by a shared experience and interest during the intense two-week training and has evolved during the certification process. Because most members needed

---

<sup>58</sup> International Association of Computer Investigative Specialists, "The Iacis Trained Computer Forensics Investigator," *The IACIS Monthly News* 1, no. 7 (1994): 7.

<sup>59</sup> Kimble, Hildreth, and Wright, "Communities of Practice," 230.

<sup>60</sup> Bill Crane, "Membership Update," *IACIS Newsletter* 1 (2008).

mentoring and assistance, networking and knowledge transfer between members occurred. Members initially used basic means of communication. At this time in IACIS' evolution, they mostly used the membership directory, the telephone, and facsimile. As IACIS grew, being a technologically inclined community, they started using an early form of collaborative technology to support their community, the Bulletin Board System (BBS).

BBS technology was not directly discussed in the earlier section on technology systems that support VCoP because the technology is no longer popular. Although it was eventually replaced, BBS technology can be considered one of the first technologies used to support VCoP, and it offered an environment for collaboration and sharing knowledge. Therefore it is worth taking a moment to briefly describe it here. BBS systems worked by having users dial into a computer that hosted BBS server software. The BBS software was distributed free of charge by its creator.<sup>61</sup> According to Kim Zetter, it is estimated that "within two years of its initial release, 200 to 300 BBSes flourished, and eventually more than 150,000 existed in North America at the peak of their popularity."<sup>62</sup> In the early 1990's, BBS systems and the transmitting data across them was a very slow process as modem transfer speeds were in the range of 300 bps to 1200 bps. Although compared to today's standards this technology was slow, the use of BBS systems by IACIS was its start of using technology to support VCoP, and it created a rudimentary form of knowledge exchange across a dispersed membership group of IACIS members.

As the technology advanced, so did IACIS' use of it. For many years, in addition to legacy telephone, fax, and BBS exchanges most members utilized email between members. Through this means asynchronous conversations developed and knowledge was shared between a limited group of members. Specifically, those that were included in the email conversation thread. A brief example of the type of usage follows:

---

<sup>61</sup> Kim Zetter, "How Humble Bbs Begat Wired World," *Wired*, (2005).

<sup>62</sup> Ibid.

A former student and / or IACIS member would be working through a technical problem related to the domain of computer forensics. The student, in need of guidance and mentoring, would email his designated IACIS coach. The email would generally provide a brief description of the contextual scenario and move on to the problem at hand. The coach in turn may or may not know the solution. If the coach could provide the necessary guidance then a direct email response would be provided to the student and the conversation would end there. Other members would not have been afforded the opportunity to learn from the student / coach engagement. However, if the coach did not have the necessary knowledge to provide the needed guidance then the coach would add additional members to the conversation by forwarding the email to other members and / or coaches that he believed would have the requisite knowledge. Through this means the conversation participants would grow. A larger membership subset, however still a relatively small set, would then be exposed to the contents of the conversation. This would enable a larger membership population to have the opportunity to share knowledge with other community members.

As technology continued to progress, IACIS members started participating in a new form of technology: the IACIS list serve. This significantly increased the exchange of information between community members and firmly established a VCoP. Now, no matter what time of day, a user in need of assistance could email the list serve. Usually within minutes members would email the list serve back with an answer or guidance. The use of this technology was extremely beneficial from a knowledge-sharing perspective. It enabled IACIS membership not directly involved with the issue to be exposed to the question and subsequent responses. Members could read about the various solutions suggested. From time to time, constructive discourse would follow and the membership would benefit from reading through these exchanges. As an added benefit, the board of directors of IACIS made the decision to maintain the list serve emails in an archived format. By doing so the discussions were saved and could be searched by current and future membership. Having the ability to refer to these messages and discussions at a later time can mitigate the loss of organizational memory. The most significant knowledge sharing benefit came as members actively read or participated in the various discussions.

By 2007 it was time for the IACIS board of directors to again move forward with another technological upgrade. At this time they deployed Web 2.0 technology to enhance the functionality within their VCoP. In September 2007 the IACIS board deployed a web server capable of supporting groups, forums and membership directories, as well as many additional features.<sup>63</sup> From a VCoP perspective the addition of membership directories, forums and group membership identification was significant. According to John D. Smith et al.,

A community that grows beyond a few dozen people needs a roster of members. As people join and leave, members need to be able to keep track of who currently consider themselves members. Having a directory that is specific to a community also makes it possible to use "local" terminology that makes sense only inside the community. Members may share information about themselves inside the community space that they would not want shared outside. What's useful depends on the needs, interests, and composition of the community. More information can be included in personal pages. A member directory should reduce the effort involved in visualizing the community as a whole and in contacting specific subgroups or individuals.<sup>64</sup>

Forums and groups allowed for the membership to move directly to the areas that most interested them. When searching or looking for a specific knowledge area, users could move directly to a specific forum saving time and resources. They could also query the membership directory for those with a skill set in need, enabling them to focus their effort in the most efficient manner.

### **C. NEW JERSEY REGIONAL OPERATIONS AND INTELLIGENCE CENTER (ROIC) TASK FORCE**

The New Jersey Regional Operations and Intelligence Center (ROIC), commonly referred to as the "rock" within the law enforcement intelligence community, was established in January 2005.<sup>65</sup> On January 24, 2007, the ROIC moved to its permanent

---

<sup>63</sup> Robert W. Spitler II, email message to author, September 13, 2007.

<sup>64</sup> Smith, "Technology for Communities Tools Wiki."

<sup>65</sup> GAO, "Homeland Security."



facility located in what is described as a “cutting edge” building located at New Jersey’s State Police Headquarters.<sup>66</sup> The mission of the ROIC is:

To collect, analyze, and disseminate intelligence to participating law enforcement entities; evaluate intelligence for reliability and validity; provide intelligence support to tactical and strategic planning; evaluate intelligence in the Statewide Intelligence Management System; and disseminate terrorism-related activity and information to the Federal Bureau of Investigation, among others. ROIC is also the home of the State Emergency Operations Center, the State Office of Emergency Management, and the State Police Emergency Management Section Offices.<sup>67</sup>

According to Governor Corzine,

This building gives us the best tools available to look at what's going on, anticipate what happens next, prepare for any possibility and respond when crisis strikes...This facility is amazing, but the policies, procedures, and people are what make it work and they all deserve our gratitude and thanks.<sup>68</sup>

As Governor Corzine mentioned, what makes the ROIC so valuable is how the men and women that work there function and operate together. One of the concepts of the ROIC was to bring intelligence from many sources into one location to be processed and analyzed and in turn provide an intelligence product that is more than just the sum of its individual inputs. The intent was to create an environment where collaboration and information sharing prevails. The ROIC is New Jersey’s hub for intelligence and has participant members from many state agencies, as well as other agencies such as the New York Police Department, Federal Bureau of Investigation, Department of Homeland Security, and Federal Emergency Management Agency.<sup>69</sup> The New Jersey State Police

---

<sup>66</sup> New Jersey State Police, "Governor Corzine and Law Enforcement Officials Open State-of-the-Art Emergency Management Facility," New Jersey State Police Official Press Release (2007) <http://www.state.nj.us/njsp/news/pr012407.html>.

<sup>67</sup> GAO, "Homeland Security," 87.

<sup>68</sup> New Jersey, "Governor Corzine."

<sup>69</sup> Ibid.

have championed the cause of intelligence led policing and the ROIC's analytical functions are a key ingredient in that effort.<sup>70</sup>

The ROIC is comprised of three core functions:

(1) an analysis component, responsible for collecting, analyzing, and disseminating intelligence information entered into the Statewide Intelligence Management System by local, county, state, and federal law enforcement; (2) the operations component, which will control the actions of State Police operational and support personnel and serve as a liaison to federal agencies, other state entities, and county or municipal agencies on operational matters; and (3) a call center component, which will provide the center with situational awareness intelligence about emergency situations.<sup>71</sup>

For the purposes of this writing, the author will be focusing on data from within the analytical unit of the ROIC, currently led by Lt. Ray Guidetti of the New Jersey State Police. According to Guidetti, "what we are doing is forcing collaboration among folks in an interagency environment. That's a paradigm shift in law enforcement in general."<sup>72</sup>

## **1. User Demographic**

It is important to briefly discuss the VCoP's user demographics because these factors can contribute to participation, the building of social trust, and the overall use of the VCoP. As pointed out by C. Kimble, "in a CoP, legitimization comes from social relationships that develop. As members get to know each other, they are better able to judge the information they receive from their partners. This shows the human aspect of a CoP to be of major importance."<sup>73</sup> The ROIC has law enforcement and intelligence personnel

...assigned from the Federal Bureau of Investigation, Department of Homeland Security, Alcohol Tobacco and Firearms, Immigration and Customs Enforcement, Federal Air Marshal Service, and the U.S. Coast

---

<sup>70</sup> New Jersey, "Governor Corzine."

<sup>71</sup> GAO, "Homeland Security."

<sup>72</sup> Ben Bain, "A New Threat, a New Institution: The Fusion Center," *Federal Computer Weekly*, (2008).

<sup>73</sup> Kimble, Hildreth, and Wright, "Communities of Practice" 230.

Guard, in addition to personnel from the State Police, New Jersey Office of Homeland Security and Preparedness, and the Department of Transportation. The ROIC is seeking representation from the departments of Corrections, Parole, Health and Senior Services; Environmental Protection; and Military and Veteran Affairs.<sup>74</sup>

The analytical component has 32 participants contributing in a VCoP. The VCoP was developed to be a virtual platform to exchange information and knowledge. It was not created to be a substitute for criminal intelligence databases but rather to be a working area where participants collaborate on various homeland security related topics relevant to their mission.<sup>75</sup> Membership includes male and female, sworn and civilian, who work and reside primarily in the New Jersey area.

## **2. Types of Technology Used by the ROIC to Facilitate VCoP**

Significant investment went into all components of the ROIC's technology infrastructure. Using a portion of this technological infrastructure, the analytical unit was able to implement Web 2.0 technology to support the sharing of information between analysts within the ROIC. This was accomplished by configuring several web-based tools to facilitate online collaboration. To facilitate the VCoP, the ROIC uses forums, emails, announcements, wikis, and a member directory component, as well as other miscellaneous technologically based tools.

ROIC analysts have access to a web-based information and knowledge exchange where members can communicate ideas and share experiences with each other. This "knowledge exchange" area was designed to be a virtual location where knowledge transfer between members would be encouraged. The primary technology used is based on forum technology. This area is comprised of several discussion sections which include operational functions, group announcements, a social information area, a reading list component, an after action reports area, and an analyst resource area. Within the operation components, the uses are only limited by the imagination of the community

---

<sup>74</sup> GAO, "Homeland Security."

<sup>75</sup> Ray Guidetti, "NJ ROIC Information and Knowledge Exchange." Regional Operations Intelligence Center, restricted website.

members. This is the area where core knowledge is shared between members. From sharing links to useful information, to suggestions and discussions on how to perform a task more efficiently, users can work together in this area to find solutions to their individual or collective problems. These forums allow users to subscribe to them on an individual basis. This enables the supporting technology to send out automatic emails when other members create or respond to postings. By using this feature, users are able to focus in on specific areas based on their business needs and requirements. There is an announcements section which allows site administrators to post global messages, as well as an area for users to post general news types of information that they believe is important to the community. There is a wiki area that allows users to work collaboratively on working documents. Using wiki documents allow users to manage, access, and edit through setting user permissions. This enables editing to be accomplished by those approved to do so while still allowing other users to review the work in progress. The ROIC uses a member directory component so that users can post biographical information about themselves. This area adds to the community environment as users can refer to this area for background information on other members. It is also an area to identify users with specific skills in certain knowledge areas. In turn, users who are seeking help can look to this area for those with expertise that can help them.

THIS PAGE INTENTIONALLY LEFT BLANK

## V. ANALYSIS

Several interviews were conducted with members from within the law enforcement community to get their perspectives on the use of VCoP and whether or not the VCoP help to facilitate the transfer of knowledge, both tacit and explicit, within the context of a VCoP. These interviews were conducted in a conversational manner based on fourteen pre-defined questions. Follow up questions were asked based on the interviewee's responses. It should be noted that several of the questions asked were based, in part, on questions found in research by Peter Stoyko and Yulin Fang.<sup>76</sup> Some of the questions were taken in their entirety while others were modified to be more relevant to this research. Interviews were held with those who have been exposed to VCoP environments and those who have worked in an environment that required shared knowledge and collaboration amongst its members. In this chapter, a review of the questions asked and an analysis of the responses provided will be presented.

**1. Is knowledge that is crucial to your work unit shared among your immediate colleagues?** All of the respondents believed that the sharing of knowledge between their work colleagues was a crucial component to the organization and to their organizational unit. The responses varied as to the extent that this was currently being done within their work units. Several of the respondents stated that this was done through face to face meetings as well as formal unit reports and documentation efforts. One respondent elaborated that some individuals were reluctant to share their knowledge and experience with others because the knowledge was perceived as valuable to that individual. It was perceived as a way to create job security making that individual difficult to replace. This is a theme that comes up throughout the various interviews. One respondent alluded to the fact that by using a VCoP to share knowledge with colleagues that members' discussions would be maintained and that knowledge could be referenced

---

<sup>76</sup> Stoyko and Fang, "Lost and Found," 24.

later whether the creator wanted to share it or not. This in part could mitigate the reluctance to share critical knowledge with colleagues. It is also a means to mitigate the loss of organizational memory.

**2. Do your immediate colleagues collectively reflect on experiences in order to draw practical lessons?** All of the respondents believed this to be an important aspect of their jobs. Many currently accomplish this through the use of traditional means. They consult fellow colleagues, have unit meetings, and review organizational documents and after action reports. Additionally, some respondents utilize VCoP technologies to draw practical lessons from past experiences. For example, respondents that utilize the IACIS VCoP review past exchanges to learn how to handle current problems. Through the use of their VCoP they exchange documents, post various problems and solutions, and attempt to create a body of knowledge for future use.

**3. In your work unit, are past knowledge and experiences taken into account when making important decisions?** All of the respondents described taking into account past knowledge and experiences as being an important factor for law enforcement organizations. However, some of the respondents pointed out that in their business, unit reviewing past experiences was not always possible. They attributed this to many reasons including, individuals not readily sharing information deemed valuable to themselves, no central knowledge repository, time constraints researching hard copy past documents, and after action reports. One Miami Police Department commander estimated that in his experience at the Miami Police Department, “ninety percent of the time we at the MPD do not pass on the institutional knowledge to the next guy. In turn we end up making many of the mistakes that were made by our predecessors, which might have been avoided.” Other respondents mentioned that a VCoP setting would help mitigate the loss of organizational knowledge by having a central repository for online documents and a site to review past knowledge exchanges. One respondent pointed out that the use, or the lack of use, of VCoP for this purpose may be generational. He pointed out that many of the senior officers and commanders would be reluctant to use such a technologically based system. He stated that it was his belief that with the newer, younger generation now entering the workforce a VCoP would more likely than not be a primary resource. A

system looked to as a knowledge base before other means, such as hard copy document repositories and libraries. He elaborated with a good example. The older generation used paper for their documentation activities. They would write memorandums to file, hard copy after action reports, and interoffice memorandums. The younger generation, being brought up on computer technology, is primarily accustomed to electronic means of communication. This inclination to use technology would likely lead to a greater acceptance of the use of VCoPs for organizational knowledge exchanges.

**4. When an immediate colleague decides to leave, is there an attempt to draw lessons from that person's insights and experiences?** The responses to this question were mixed. Although all respondents believed it was important to draw lessons from those individuals leaving a business unit to preserve organizational memory, but not all respondents believed that this was occurring. One of the themes that came up in the responses to this question was the fact that it primarily depends on the circumstances of the individual's departure as well as the individual's work ethic. Is the individual leaving the business unit leaving on good terms? Or, are they being removed? Is the individual's work ethic one of sharing information and knowledge with others or one that hoards information and knowledge for the perceived value of that knowledge? There is also the aspect of short notice departures such as the tenured employee who decides to quickly take another position outside the organization, retires, or otherwise becomes unavailable. In this scenario, some respondents believed that if VCoP technology was implemented within the business unit, over time, that it would in fact mitigate the loss of organizational memory. Most respondents agreed that explicit knowledge would most likely be maintained in this environment and that there was probability that tacit knowledge could be transferred to users of the VCoP.

**5. Do supervisors encourage the capture and sharing of tacit and explicit knowledge?** Many of the respondents believed that supervisors could do a better job in this particular area. Some respondents reported that although this is a good and needed concept there are minimal mechanisms for the capture of this knowledge. One of the MPD commanders mentioned that there was essentially no way for the "elders" to write this information down in a manner that would actually be used. Another MPD



commander mentioned that it is something that should be done; however, he cited time constraints as an inhibiting factor. This respondent went on to state that individuals sometimes lack the ability to articulate the knowledge that they want to pass on. This is a good example of a respondent referring to the difficulty in codifying and transferring tacit knowledge. This respondent also stated that many times individuals would rather just do a work function themselves rather than take the time to try and codify it for others to use later. This is where supervisors encouraging the codification would be beneficial.

Another respondent reported that in his opinion “eighty – ninety percent of MPD business units do not codify member’s explicit and tacit knowledge.” One of the reasons cited for this was the recurring theme for not wanting to share information perceived valuable to the individual. The respondents to this question believed that there is potential benefit of using a VCoP for this function. At least one respondent believed that VCoP technologies would be most applicable to explicit knowledge transfer; however, he did mention that it would probably be possible to transfer tacit knowledge in some circumstances. Some stated that the technology would have to be simpler to use, intuitive, and encouraged, if not mandated, by supervisors and senior leadership before user acceptance would take hold.

**6. Do your immediate colleagues who are nearing retirement teach others about their knowledge and experiences?** Many respondents answered this question by indicating that the transfer of knowledge from individuals who are nearing retirement is an important function to mitigate the loss of organizational memory. Many of the respondents stated that the transfer of knowledge from those nearing retirement is not always accomplished for varied reasons. Some reasons include: time constraints, individual desire not to share knowledge for personal reasons, and the lack of an organizational mechanism for this knowledge transfer. Some respondents stated that VCoP technologies would be a preferred mechanism for an organization to capture and store this knowledge so that others can learn from it. Some of the respondents discussed one of the themes throughout many of the questions, which is the willingness on the part of the individual to actually desire to share their knowledge. Those respondents involved with the IACIS VCoP, primarily of technology based users, seemed to believe that the

sharing of technology based information would be likely. Many of the users of this type of VCoP “need” each other to solve problems. Therefore, there is an inherent desire to exchange knowledge with each other for mutual and community benefit. Respondents familiar with these technology based VCoP exchanges believe that explicit and tacit knowledge could be codified and transferred.

**7. Do people in your work unit have opportunities to meet with others in their occupational group in order to share knowledge?** Most respondents believed that members had opportunities to meet with others in their occupational group. One respondent discussed a good example where members of his business unit needed to share knowledge with a parallel business unit. Although they shared the same business domain there, business tactics differed. To learn from each other, they would set up meetings for business unit group members to meet face to face and learn each other’s tactics. The respondent described this scenario as a perfect example where a VCoP could reduce the time and effort involved with the sharing of this knowledge. By sharing their knowledge in a VCoP, all users would be able to contribute, and future members of the business unit could also learn from the online exchanges. Another respondent believed that with today’s technology a VCoP would be the most effective way for occupational groups to share knowledge.

**8. Is the knowledge and expertise needed to do your job easily accessible using available technology?** There were mixed responses to this question from the respondents. From a policy and procedures perspective most respondents believed that the information was readily available and well-documented, however, not necessarily in electronic format yet. Many of the respondents believed that their organizations were heading in that direction but were not quite there yet. As with the responses to some of the previous questions, several of the respondents believed that VCoP technologies could be beneficial in codifying information and knowledge for future organizational use. Most respondents believed that explicit knowledge would be easily codified for use but that tacit knowledge is more difficult to articulate and transfer in electronic format. Many respondents believed that VCoP technologies, if properly configured and implemented, could increase the accessibility of the available knowledge base to organizational users.

**9. Are documents within your work unit organized in a way that you find useful?** Most respondents believed that their unit's document organization systems were within acceptable limits; however, many suggested that improvements would be welcomed. Respondents stated that VCoP technologies would be beneficial in the organization and usefulness of business documents. Many stated that using a VCoP, setup correctly with ease of use in mind, would increase the accessibility of the information and knowledge stored. More users would then be more inclined to seek out the VCoP for knowledge transfer.

**10. Are people in your work unit encouraged to build networks for the purpose of sharing expertise and knowledge?** Most respondents believed that this was important and mostly encouraged. Most respondents mentioned that currently this primarily occurs face to face at meetings, training events, and other scenarios that bring business unit members together. Some respondents reported that this also occurs on an individual basis through the use of email and list serve exchanges. Overall, the respondents believed that formal VCoP environment encourage the building of social networks and that in these VCoP knowledge sharing would occur.

**11. Is knowledge within your organization regularly shared across organizational boundaries?** This particular question solicited responses that were mostly in the negative. A few respondents believed that their business unit had the ability to distribute information when needed. However, these descriptions did not rise to the level of knowledge sharing. One respondent suggested that unless an individual made an overt attempt to contact external business units for specific information, sharing would not occur. Respondents believed that VCoP could bridge the divide between organizational boundaries and facilitate the transfer of valuable knowledge between organizational members.

**12. Do you / would you use a VCoP?** All respondents have been a part of a VCoP in some format. One MPD commander stated that "we have to use VCoP technology!" He elaborated that with the younger generation of employees this is a technology that they understand and embrace. In response to this question, another respondent mentioned that he believed that VCoP technologies would certainly lead to

the ability to transfer both explicit and tacit knowledge. Another respondent believed that the VCoP may not be as valuable immediately following deployment; however, over time as the usage and content increased the system would become extremely valuable to an organization. Most respondents believed that a VCoP would mitigate the loss of organizational memory. Another respondent to this question made it clear that, in his experience using a VCoP, knowledge *is* and can be transferred in these environments.

**13. What are the positives of using a VCoP?** As part of this question, respondents were also asked about potential negatives of using a VCoP. Through discussing the responses to this question numerous descriptions of positive attributes were mentioned. Some of these include:

- The data and information stored in the VCoP could be referenced by new members to the community. Although individuals may not be directly involved in the online discussions at the time, by reviewing the information within the VCoP knowledge transfer could occur. One technology respondent cited an example that when posting a question to the community, a couple of responses were pointing him to the fact that a simple search of the VCoP site would have revealed the answer.
- Knowledge could be maintained indefinitely and continued to be made available for generations to come.
- Ability to link information and knowledge across organizational boundaries. In the opinions of the respondents, current VCoP technologies are far better and more efficient to accomplish this link than previous legacy organizational systems.
- Ease of sharing information in a community environment. One respondent mentioned that some individuals are more introverted and resistant to making inquiries in face to face settings. The respondent believed that VCoP may encourage participation from those that might not otherwise participate in a face to face setting.
- VCoP create a central location where users can go to seek information. Users would be able to save time by going to one location for their information. The information would be available at all times and not dependent on personnel or work hours. This was especially cited by the IACIS VCoP respondents because of the technical issues and the international membership which tends to have users online for all different time zones. So although a user may be working after hours and need to discuss an issue, there is a good likelihood that another user would be working their normal business hours.

- Ability to “push” information out to identified users based on predefined criteria and individual preferences.
- Ability to search across many data types and sources within the VCoP. This would not be possible with paper-based archives.
- Ability to learn from others indirectly. Users would be able to access another’s experience and knowledge without having to be directly in front of them. Users could even identify other user’s social networks and be able to identify important contacts otherwise not available to them. This would also enable them to expand their social network.
- Depending on the VCoP configuration, ability to collaborate with individuals from external agencies in a manner previously limited by technology.
- Ability to mitigate the loss of organizational memory. “won’t lose knowledge when organizational members leave.”

Some negatives involved with using VCoP discussed included:

- Individuals concerned with the validity of their postings and comments and how they would be perceived within the community.
- Organization, supervisor, and peer retribution for comments made online.
- Older generations hesitant to utilize technology for social networking and knowledge exchange.
- Users reluctant to participate in knowledge sharing for fear of sharing information perceived “valuable” to themselves. By sharing their knowledge they may be losing job security.
- Cost of training and perceived difficulty of use of the VCoP.
- VCoP not properly configured could lead to information becoming overwhelming. Information could be perceived as being too difficult to find.

**14. Do you think using a VCoP in an attempt to codify knowledge (explicit or tacit) is possible / beneficial?** All respondents believed that using a VCoP to codify explicit and tacit knowledge was possible and beneficial to an organization. Each believed that it would mitigate the loss of organizational memory. One respondent provided a good example when he explained the transfer of tacit knowledge in a VCoP environment. He related his explanation as to how the transfer would take place, “it sort of works like a complex jigsaw puzzle. You may only have six of the pieces to the puzzle but someone else in the community may see how you laid out those pieces and comes up

with the missing piece that fits everything together." So even if one does not come up with a complete solution, the process of throwing ideas up on a board helps to set the stage for the transfer of tacit knowledge - reading a sentence may trigger an idea and lead one to knowledge creation. Another respondent pointed to the importance of a user's reputation when it comes to the value of codification. Especially in the technology and intelligence based environments, a user who is well respected within the community will have his posting or discussion weighted and valued more. This can also create an area for users to strive to build their online reputations by posting and discussing topics deemed important by the community.

The respondents interviewed were very insightful with their comments and observations. It is clear that all of them believe that there is significant potential for the transfer of explicit and tacit knowledge within a law enforcement VCoP. Legitimate caveats were brought up by the respondents; however, the consensus was that if properly implemented and fostered by the organization, a VCoP could indeed mitigate the loss of organizational memory. In the following final chapter, the respondent's comments will be related to the relevant literature and final observations and recommendations will be made on how to most effectively utilize a VCoP to foster knowledge transfer while at the same time mitigating the loss of organizational memory.

THIS PAGE LEFT INTENTIONALLY LEFT BLANK

## VI. CONCLUSION

The research conducted for this thesis would suggest that a VCoP can mitigate the loss of organizational memory. Interview data, along with case site reviews, support the use of VCoP to mitigate the loss of organizational memory while providing a means for the transfer of explicit knowledge by those participating in the VCoP. Respondents believed that it would be possible to transfer explicit knowledge within a VCoP. As it relates to the transfer of tacit knowledge in a VCoP environment, many respondents believed that it would be possible to transfer tacit knowledge in a VCoP; however, it would be far more difficult to do so. The consensus amongst the respondents, as well as much of the literature reviewed, suggested that it is more difficult to codify tacit knowledge and convert it into explicit knowledge. A VCoP can provide a law enforcement entity the organizational framework to share, store and transfer knowledge. This organizational framework can be in the form of Web 2.0 information technology that is customized to support the needs of the VCoP. As Fernando Olivera explained in his research about memory systems in organizations,

...an organization's ability to collect, store, and use knowledge it has generated through experience can have important consequences for its performance. Storing and using knowledge effectively can buffer the organization from the disruptive effects of turnover, facilitate co-ordination, contribute to the development of innovative products, and may even serve to rebuild an organization.<sup>77</sup>

Based on the review of the case study sites, the literature reviewed, and while speaking with those interviewed, it seemed that there were certain factors that could influence the participation in a VCoP. Participation and contribution is critical for there to be knowledge exchange and codification of explicit and tacit knowledge. Michael Zarb, in his master's dissertation (2006), *Modeling Participation in a VCoP*, did significant research in the area of participation in VCoPs and highlighted Wenger's work on the reasons for participation. Zarb, based on his research, summarized participation in a VCoP to be driven by three envelope motivators, "self development, a sense of

---

<sup>77</sup> Olivera, "Memory Systems in Organizations," 811-32.



belonging, reputation development and acknowledgement.”<sup>78</sup> Additionally, Watson and Hewett used social exchange theory and expectancy theory to discuss why individuals utilize organizational knowledge management systems in their multi theoretical model of knowledge transfer. Their discussion on the social forces that encourage users to contribute is relevant to the discussion of participation in a VCoP. They discussed the implications of social trust and the idea of reciprocity as it relates to contribution.<sup>79</sup> It is important to briefly discuss some of these factors that influence participation. This is because without participation and “buy in” it would be very difficult to develop a VCoP where knowledge could be shared and created. This is also suggested by C. Kimble, P. Hildreth and P. Wright in their article, *Communities of Practice: Going Virtual*. They wrote:

Moving to a virtual environment also raises the question of whether it will be more difficult to gain legitimacy in such a community but perhaps the most difficult area will be the facilitation of participation. Participation is central to the evolution of a community. It is essential for the creation of the relationships that help to build the trust and identity that define a community.<sup>80</sup>

The literature suggested that in an organizational environment participation in a VCoP can be enhanced by the role of a champion. The champion is someone in the organization who sees the value in the VCoP and who works diligently to encourage participation and the continuous adding of value to the VCoP. It is a difficult role as there can, and oftentimes is, resistance to change. According to Wenger et al.

All members contribute to the togetherness of the community by participating more or less actively, but the role of cultivating the community is often taken on by a person or a small group, though this

---

<sup>78</sup> Michael P. Zarb, "Modeling Participation in Virtual Communities of Practice" (master's thesis, University of Leicester, Leicester, U.K., 2006), 27.

<sup>79</sup> Sharon Watson and Kelly Hewett, "A Multi-Theoretical Model of Knowledge Transfer in Organizations: Determinants of Knowledge Contribution and Knowledge Reuse," *Journal of Management Studies* 43, no. 2 (2006).

<sup>80</sup> Kimble, Hildreth, and Wright, "Communities of Practice" 224.

stewardship usually becomes more distributed in mature communities. In a community that depends on technologies for being together, tending to the technology becomes an important role.<sup>81</sup>

The individual in the champion role is going to need to create an online atmosphere where social trust can be developed. VCoPs are a relatively new social setting and users may not get the benefit of face to face meetings where, in the physical world, trust can be built. When a user shares experiences and knowledge in a VCoP, they are exposing themselves to their peers and others in the community. Without building social trust within the community, users may be reluctant to contribute for fear of being viewed as incompetent or inexperienced. The individual may decide to remain silent rather than contribute to the discussions. Although they may gain knowledge by observing the discussions and contributions of others, the knowledge exchange would not grow. Over time this could lead to fewer and fewer participants and an ultimate failure of the VCoP. A champion can start to build and foster social trust within a VCoP by highlighting the successful and valuable postings of others. One way to do this is by setting up behavioral parameters within the VCoP. Behavioral parameters allow members to rate other user's contributions and can provide positive reinforcement. High ratings by other members can build a user's confidence and lead to increased contribution in the future. A good example of this was discussed by Young and Tseng in their research of school teachers using an online environment to share knowledge,

Those informants who shared their successful experiences online were appreciated by unknown others, which reinforced the sense of trust and thereby removed the barrier of worry about interfering with the professional territory of others: "a teacher proposed a class management question on SCTNet that indicated that he was helpless in controlling the classroom. I posted my class management design and received many thanks from unknown others. I was so surprised that I, as a small potato, could help so many teachers! From then on, I loved to share on SCTNet and have done so ever since."<sup>82</sup>

---

<sup>81</sup> Etienne Wenger, Nancy White, John Smith, and Kim Rowe, "Cefrio Book Chapter 5," Technology for Communities (2005), [http://technologyforcommunities.com/CEFRIO\\_Book\\_Chapter\\_v\\_5.2.pdf](http://technologyforcommunities.com/CEFRIO_Book_Chapter_v_5.2.pdf) (from unpublished book Digital Habitats: Stewarding Technology for Communities, anticipated to be published in 2009).

<sup>82</sup> Mei-Lien Young and Fan Chuan Tseng, "Interplay between Physical and Virtual Settings for Online Interpersonal Trust Formation in Knowledge-Sharing Practice," *Cyber Psychology & Behavior* 11, no. 1 (2008): 61.

This is just one example of how positive reinforcement for a user's posting can help to stimulate additional VCoP usage while simultaneously building social trust. According to Young and Tseng their study indicated that,

Those who manage online communities via information technology should consider the context in which participants are situated, the social role they play, the structural characteristics of the community, and the shared purpose underlying participation in the online environment. A better understanding of the interplay between the formation of trust in physical and online communities will help managers to achieve the business goals of online communities. We believe that organizations that incorporate trust-enabling mechanisms between the physical and virtual worlds will be more successful in knowledge sharing practice and knowledge –creating activities.<sup>83</sup>

In addition to the role of champion it is important to note the role of organizational leaders and their sponsorship, especially within government organizations. William Snyder and Etienne Wenger in a research study, *Communities of Practice in Government: the Case for Sponsorship*, argued that executive sponsorship for community based knowledge networks is important and the following, which highlights this, is from a brief portion of their argument's summary:

One of the main lessons learned in a decade of intentional initiatives to cultivate communities of practice in leading organizations is the need for executive sponsorship. Executives need to understand the role of sponsorship and the forms it can take. Community sponsorship should become an institutionalized dimension of government leadership roles. Sponsorship for community initiatives has to be built explicitly and systematically into the work of government, both in the design of legislative mandates and in the management strategies of White House and agency leaders. Without strong leadership from senior government officials, community initiatives will not take root or fulfill their potential for strategic impact.<sup>84</sup>

---

<sup>83</sup> Mei-Lien Young and Fan Chuan Tseng, "Interplay between Physical and Virtual Settings for Online Interpersonal Trust Formation in Knowledge-Sharing Practice," *Cyber Psychology & Behavior* 11, no. 1 (2008): 62.

<sup>84</sup> William M. Snyder and Etienne. Wenger, "Communities of Practice in Government the Case for Sponsorship" (CIO Council of the US Federal Government 2003), 2: <http://www.ewenger.com/pub/pubusfedciodownload>.

During the interviews described in Chapter V, one of the respondents made an insightful comment that relates to participation. This particular respondent had the added experience of being both a technical user as well as one that worked within a national homeland security intelligence center environment. He asserted that for users to gravitate to a VCoP the site should first be “seeded” with relevant and important information and materials related to the communities’ domain. By “seeding” the VCoP an organization can create the “need” to seek out the VCoP. Wenger and Snyder briefly described the successful VCoP CompanyCommand.com in their research. This was a site initially created by two Army officers to facilitate knowledge sharing. Wenger and Snyder described how in the beginning the two founders sought out the help of a team of ten to help develop the site. They described,

The success of the CompanyCommand website compared to the failure of most on-line initiatives is the exception that proves the rule: high-tech only works in combination with high-touch. The vitality and usefulness of the CompanyCommand.com website depends on a team of nearly 10 passionate core-group members who write up newsletter items; field questions; connect members to peers for problem solving; upload documents, video clips, photographs and other material; recruit participants; cultivate support of senior officials; and finally, tweak the functions and design of the technology to make it easier to use. The community’s core group help to personalize the site, make it a comfortable place to browse and contribute—while also applying a rigorous discipline to make sure the content is fresh, well presented, and useful.<sup>85</sup>

Wenger and Snyder’s discussion about CompanyCommand.com is highlighted here to point out the benefit of “seeding” a VCoP. By having the core team of ten work to populate the site the founders of CompanyCommand.com created an environment and location where other members “needed” to go if they wanted to learn from the useful information contained within the VCoP.

There can be many reasons for an individual to participate in a law enforcement related VCoP. Participation may be based on a particular job assignment where

---

<sup>85</sup> William M. Snyder and Etienne. Wenger, "Communities of Practice in Government the Case for Sponsorship" (CIO Council of the US Federal Government 2003), 2: <http://www.ewenger.com/pub/pubusfedciodownload>.

participation is a requirement. It may be based on the individual's desire for social interactions with members of a specific domain. An individual may participate out of a need for information contained within a community of experts. Participation may be based on the desire to showcase one's own knowledge in front of peers or the desire to help others within their community. By sponsoring and championing law enforcement VCoP organizations can create an environment that fosters explicit and tacit knowledge exchange. Having a VCoP environment that encourages community activities, such as participating in discussions, answering user postings and pointing users to additional resources, will lead to knowledge transfer amongst its members. If participation takes hold and members seek the community for knowledge, content will grow and become more meaningful to the organization. Organizational memory will be increased and a more efficient organizational system for knowledge sharing will lead to improved organizational results. Continuous positive reinforcement by sponsors, champions, and users themselves, should be encouraged. By doing so it is likely that a successful VCoP will continue to flourish and provide results to the organization and the community members. Utilizing VCoPs to create collaborative environments will enable law enforcement organizations to find a way to increase organizational memory while at the same time allow users to share and exchange explicit and tacit knowledge.

**A. BEST PRACTICES FOR LAW ENFORCEMENT'S IMPLEMENTATION OF VCoP TECHNOLOGIES AS AN ORGANIZATIONAL MEMORY SYSTEM TO SUPPORT KNOWLEDGE CODIFICATION AND TRANSFER**

There is no one size fits all best practices for developing a widely used VCoP. As a social network, there are many factors that can come into play and can influence user acceptance levels. The following is a suggested approach for those homeland security leaders that will be looking to incorporate VCoP technologies to mitigate the loss of organizational memory and to enhance knowledge sharing activities.

- **Determine if the organization will benefit from the use of a VCoP? Is there a benefit for the organization to create a community environment to support the codification and sharing of knowledge?**

As discussed in this thesis, there are positives to utilizing VCoP technologies; however, there are organizations where other systems may be more appropriate or more efficient. For example, a small organizational group focusing on technological topics, which regularly meets to discuss issues and routinely documents activities in a technological knowledge base, may benefit less from a VCoP implementation.

- **Is a VCoP implementation necessary in the current environment? If so, is there another VCoP already in existence that can serve the current need?**

Prior to starting a VCoP from the ground up, it would be wise to determine if there is already a viable community established. If there is, can organizational needs be met by joining the established community?

- **Identify senior executive sponsors.**

As with any organizational change, it is important to have executive sponsorship. As pointed out by Snyder and Wenger (discussed above), this is especially the case in government organizations.<sup>86</sup> As mentioned by at least two of the interview respondents, VCoP have a cultural aspect, especially when it comes to user acceptance. It is important that executive stewards are fully behind and actively support the VCoP effort.

- **Identify a champion(s).**

Having a committed and motivated champion is an important role in the establishment of a VCoP. The champion can act as a catalyst to user participation and a catalyst to discussions that increase the sharing of knowledge. In the initial phases of a VCoP this role is especially important. As pointed out by Wenger, “stewardship usually becomes more distributed in mature communities.”<sup>87</sup>

---

<sup>86</sup> Snyder and Wenger, "Communities of Practice," 2.

<sup>87</sup> Wenger et al., "Cefrio Book Chapter 5," 3.

- **Identify a “technology steward.”**

Wenger highlights the need for a “technology steward.” The term refers to the “tending to the technology role as if it referred to one person even though in many cases it’s a role that involves several people. This tending role, whoever contributes to it, includes configuring an array of technological support that enables the community to function.”<sup>88</sup> This will be the person or group of people charged with identifying and configuring the technologies best suited for the VCoP to be developed. As discussed in Chapter II, there are many supporting technologies that should be reviewed. Combining the “right” Web 2.0 technology toolset will enhance the prospects of a widely used VCoP. Caution should be used not to use too many tools that may possibly create an environment of perceived user information overload. Time should be spent trying to identify the best balance between need and desire for all the latest “technology tools.” Wenger pointed out that there are some considerations to implementing a technology for community use. He discussed, “design for ease of use and learning, design for evolution, design for ‘closeness at hand’, and design from a user’s perspective.”<sup>89</sup> It is also important to take into consideration the social dynamics of the user community.

- **Develop an environment that rewards participation and encourages a culture of sharing knowledge.**

As mentioned by many of the interview respondents not all individuals are willing to share their knowledge with others. There are many reasons why some people are motivated to share while others seem to hoard information. It is important for the executive stewards and the champion to focus on ways to encourage participation and knowledge sharing within the VCoP. To cite a paragraph in the business book, *The Starfish and The Spider*,

Ebay benefited from what’s called the ‘network effect.’ Say there’s only one telephone in the world. It’s not going to be worth much, right? After

---

<sup>88</sup> Wenger et al., "Cefrio Book Chapter 5," 3.

<sup>89</sup> Ibid., 10.

all, who are you going to call? But when there are two telephones, their value goes up dramatically. Each additional telephone adds value to the overall phone system.”<sup>90</sup>

Likewise, with each new VCoP member who actively contributes, so too does the value of the VCoP dramatically increase. If only a few actively contribute, then the VCoP runs the risk of having little or no value to either the members or the organization. As pointed out by Hewett and Watson’s research of knowledge transfer in organizations,

It is clear that the success of a knowledge transfer system hinges in large part not only on the extent to which the system is accessed and used, but also on the willingness of individuals within the firm to contribute their valuable knowledge to the system.<sup>91</sup>

According to CoP research by Kimble, Hildreth and Wright, one way a champion may be able to encourage dialogue and participation is through the use of shared documents. In a research article they discussed,

The other major point of interest which came out of the case studies was the use of a shared artifact, in this case a planning document to communicate and share soft [tacit] knowledge within the community but across national and cultural boundaries. The use of the document acted as a catalyst (as opposed to a vehicle) for the group members to apply their domain and soft knowledge for planning, for reflection, for discussion of issues and for solving problems. The shared document was not essential to their work but it played more roles more importantly than they had previously realized...Although the shared artifact does not solve the problem of soft [tacit] knowledge sharing in a distributed international environment the study has shown that it can be of real benefit and can play a variety of useful roles to support the sharing of soft [tacit] knowledge.<sup>92</sup>

---

<sup>90</sup> Ori Brafman and Rod A. Beckstrom, *The Starfish and the Spider: The Unstoppable Power of Leaderless Organizations* (New York: Portfolio, 2006), 166.

<sup>91</sup> Watson and Hewett, "A Multi-Theoretical Model," 170.

<sup>92</sup> Paul Hildreth, Chris Kimble, and Peter Wright, "Communities of Practice in the Distributed International Environment," *Journal of Knowledge Management* 4, no. 1 (2000): 36.



- **Make the time to ensure that users are properly trained in the use of the VCoP site technology. They must be made aware of the utility and various tools.**

Several of the respondents mentioned the need for the technology to be user friendly and enticing to the community. Oftentimes it is difficult to bring organizational members in for training; however, in the case of establishing a law enforcement VCoP it is recommended. There is still a generational divide within the law enforcement demographic. For example, in the state of Florida, there are 96,706 sworn law enforcement and correctional officers. Out of this there is approximately 29.9 percent with at least 15 years of sworn experience. Approximately 8,400 of the 96,706 have over twenty-five years of service.<sup>93</sup> For the most part, these are users that were not raised with using personal computers. For this demographic user, acceptance should be especially encouraged. Most VCoP are web-based and with the help of the technology stewards can be designed for ease of use. This more mature demographic is an important one to entice to use these systems. They have years of tacit knowledge and experience, and many of them are quickly approaching retirement age. If they can be encouraged to share their knowledge, experiences, and stories within the VCoP environment there is potential to mitigate the loss of organizational memory when they ultimately leave the organization. Explicit, and possibly tacit, knowledge will then be more likely to be codified and reused by the younger generations to follow.

- **Empower the VCoP members and encourage the building of social trust.**

Although the executive stewards and the champion are important roles, the community must develop an atmosphere of social trust. There is no quick fix to instill this trust. Some research suggests that incorporating face-to-face meetings increases the formation of social trust within VCoP. According to CoP research by Hildreth, Kimble, and Wright,

The importance of the face-to-face element even in a distributed community of practice has some interesting implications. The strong

---

<sup>93</sup> "Florida Department of Law Enforcement Criminal Justice Professionalism Program State of Florida Officer Statistics," (2008). Florida Department of Law Enforcement, restricted website.

personal relationship was felt to be essential to carry the community through the periods of e-communication. Knowing each other gave them a greater feeling of unity and common purpose or as one of the respondents put it, 'you need the personal relationship if you are to go the extra half mile for someone.' The strong personal relationship was also felt to help with the issue of identity – the members of the group felt that they knew who they were communicating with, even if it was via email.<sup>94</sup>

If face-to-face meetings are not practical, then using some of the VCoP technologies discussed in Chapter II may be helpful to develop these relationships. Using member directories, member profiles, presence indicators, and behavioral parameters all may be useful. Behavioral parameters and user ratings may highlight the “expert” users and encourage others to strive to become that “expert” participant.

- **Create the user and community need.**

With the vast amounts of technological resources available to users those seeking to adopt a VCoP solution must create a “need” for the users to want to seek out the VCoP. It may be because it clearly saves the user time and effort. This may be by enabling a user to search one location for the resources they need and having a site configured to provide the access quickly making the individual’s job easier. It may be to fulfill a user’s desire to contribute to the organization and community or it may be the user’s social need to demonstrate his wealth of knowledge and receive positive feedback for doing so. As seen with CompanyCommander.com, described above, “seeding” a VCoP with relevant and useful information may help to build the “need” to use the VCoP.

- **Follow through activities and the life cycle of the VCoP.**

VCoP have life-cycles. Dube, Bouhris, and Jacob in their journal article, Towards a Typology of VCoP, cite E. Wenger’s “Stages of Community Development.” These include the phases, “potential, coalescing, maturing, stewarding, and transformation.”<sup>95</sup>

---

<sup>94</sup> Hildreth, Kimble, and Wright, "Communities of Practice," 35.

<sup>95</sup> Line Dubé, Anne Bourhis, and Réal Jacob, "Towards a Typology of Virtual Communities of Practice," *Interdisciplinary Journal of Information, Knowledge, and Management* 1, no. 1 (2006): 75.

For the purposes of organizational follow through, it is important to note that in Wenger's transformation phase there is potential for a triggering event to cause the VCoP to "fade away and die."<sup>96</sup> As Wenger is cited,

An event – a major change in practice or work organization, a large influx of new members, a leadership change, or a high decrease in energy level – will trigger the need for renewal. The CoP may start all over again on a new basis or simply fade away and die.<sup>97</sup>

Organizational leadership should be mindful of these CoP life cycles. Executive sponsors and champions should actively work to counteract decreased usage and the potential for the community to "fade away."

For those seeking further VCoP implementation suggestions a review of the following two papers is recommended:

- Dube L., A. Bourhis, and R. Jacob. "The Impact of Structuring Characteristics on the Launching of Virtual Communities of Practice." *Journal of Organizational Change Management* 18, no. 2 (2005): 145-66.
- Wenger, Etienne. "Supporting Communities of Practice: A Survey of Community-Oriented Technologies." 68, 2001.  
<http://www.ewenger.com/tech/download.htm>

Additionally, for those interested in additional reading, within the list of references at the end of this paper is literature worth reading for those interested in VCoP and how they can mitigate the loss of organizational memory and enhance the transfer of explicit and tacit knowledge.

---

<sup>96</sup> Line Dubé, Anne Bourhis, and Réal Jacob, "Towards a Typology of Virtual Communities of Practice," *Interdisciplinary Journal of Information, Knowledge, and Management* 1, no. 1 (2006): 75.

<sup>97</sup> Ibid.

## LIST OF REFERENCES

- Alavi, Maryam. "Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues." *MIS Quarterly* 25, no. 1 (2001): 109.
- Allen, Stephanie, Donna Ure, and Stephen Evans. *Virtual Communities of Practice as Learning Networks*. Provo, Utah: Brigham Young University, 2003.
- Bain, Ben. "A New Threat, a New Institution: The Fusion Center." *Federal Computer Weekly*, February 2008.
- Bieber, Michael. "Towards Knowledge-Sharing and Learning in Virtual Professional Communities." Presentation at IEEE Computer Society - Proceedings of the 35th Hawaii International Conference on System Sciences, Hawaii, 2002.
- Blogger.com, "What's a Blog?" Google. <http://www.blogger.com>.
- Brafman, Ori and Rod A. Beckstrom. *The Starfish and the Spider: The Unstoppable Power of Leaderless Organizations*. New York: Portfolio, 2006.
- Crane, Bill. "Membership Update." *IACIS Newsletter* 1 (2008).
- Dubé, Line, Anne Bourhis, and Réal Jacob. "Towards a Typology of Virtual Communities of Practice." *Interdisciplinary Journal of Information, Knowledge, and Management* 1, no. 1 (2006): 75.
- Hildreth, Paul, Chris Kimble, and Peter Wright. "Communities of Practice in the Distributed International Environment." *Journal of Knowledge Management* 4, no. 1 (2000): 27-38.
- International Association of Computer Investigative Specialists. "The Iacis Trained Computer Forensics Investigator." *The IACIS Monthly News* 1, no. 7 (1994): 7.
- Kimble, Chris, Paul Hildreth, and Peter Wright. "Communities of Practice: Going Virtual," in *Knowledge Management and Business Model Innovation*, ed. Malhotra Yogesh, 230. Hershey, PA: Idea Publishing Group, 2001.
- Manz, Charles C., Vakas Anand, and William H. Glick, "An Organizational Memory Approach to Information Management." *Academy of Management Review* 23, no. 4 (1998): 806.
- McDermott, Richard. "Why Information Technology Inspired but Cannot Deliver Knowledge Management." *California Management Review* 41, no. 4 (1999): 110.

- Microsoft.com. "What Is Microsoft Office Sharepoint Server?" (2007)  
<http://www.microsoft.com/sharepoint/prodinfo/what.mspx>.
- New Jersey State Police. "Governor Corzine and Law Enforcement Officials Open State-of-the-Art Emergency Management Facility." New Jersey State Police Official Press Release. (2007) <http://www.state.nj.us/njsp/news/pr012407.html>.
- Nonaka, Ikujiro. "A Dynamic Theory of Organizational Knowledge Creation." *Organization Science* 5, no. 1 (1994): 15.
- Olivera, Fernando. "Memory Systems in Organizations: An Empirical Investigation of Mechanisms for Knowledge Collection, Storage and Access." *Journal of Management Studies* 37, no. 6 (2000): 811.
- Orrick, Dwayne. "Police Turnover." *Police Chief Magazine* 72, no. 9 (2005).
- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Behavioral Parameters." Tikiwiki. n.d.  
<http://technologyforcommunities.com/tools/tiki-index.php?page=Behavioral+Parameters>.
- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Instant Messaging." Tikiwiki. 2007.  
<http://technologyforcommunities.com/tools/tiki-index.php?page=Instant+messaging>.
- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Member Directory." Tikiwiki. n.d.  
<http://technologyforcommunities.com/tools/tiki-index.php?page=Member+directory>.
- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Polling." Tikiwiki. 2006.  
<http://technologyforcommunities.com/tools/tiki-index.php?page=Polling>.
- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Presence Indicator." 2006.  
<http://technologyforcommunities.com/tools/tiki-index.php?page=Presence+Indicator>.
- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Tags." Tikiwiki. n.d. <http://technologyforcommunities.com/tools/tiki-index.php?page=Tags>.

- Smith, John, Nancy White, Etienne Wenger, Denham Grey, Noel Dickover, Susanne Nyrop. "Tools for Communities Wiki." Tikiwiki. n.d.  
<http://technologyforcommunities.com/tools/tiki-print.php?page=HomePage>.
- Snyder, William M. and Etienne. Wenger. "Communities of Practice in Government the Case for Sponsorship." CIO Council of the US Federal Government, 2003.  
<http://www.ewenger.com/pub/pubusfedciodownload>.
- Stoyko, Peter and Yulin Fang. "Lost and Found : A Smart Practice Guide to Managing Organizational Memory." Ottawa: Canada School of Public Service, 2007.
- Turner, Scott. "President's Message." International Association of Computer Investigative Specialists. [http://www.iacis.com/home/presidents\\_message](http://www.iacis.com/home/presidents_message).
- U.S. Government Accountability Office. "Homeland Security: Federal Efforts Are Helping to Alleviate Some Challenges Encountered by State and Local Information Fusion Centers." GAO 08-35. Washington, D.C.: Government Accountability Office, 2007.
- Walsh, James P. and Gerado Ungson. "Organizational Memory and the Problem of Anthropomorphism." *Academy of Management Review* 16, no. 1 (1991): 61.
- Watson, Sharon and Kelly Hewett. "A Multi-Theoretical Model of Knowledge Transfer in Organizations: Determinants of Knowledge Contribution and Knowledge Reuse." *Journal of Management Studies* 43, no. 2 (2006).
- Wenger, Etienne. "Communities of Practice: A Brief Introduction." Etienne Wenger, <http://www.ewenger.com/theory/>.
- Wenger, Etienne, Nancy White, John Smith, and Kim Rowe. "Cefrio Book Chapter 5," Technology for Communities. 2005.  
[http://technologyforcommunities.com/CEFRIO\\_Book\\_Chapter\\_v\\_5.2.pdf](http://technologyforcommunities.com/CEFRIO_Book_Chapter_v_5.2.pdf). From unpublished book Digital Habitats: Stewarding Technology for Communities to be published in 2009.
- Yin, Robert K. *Case Study Research: Design and Methods*, 3rd ed. Thousand Oaks, CA: Sage Publications Inc, 2003.
- Young, Mei-Lien and Fan Chuan Tseng. "Interplay between Physical and Virtual Settings for Online Interpersonal Trust Formation in Knowledge-Sharing Practice." *Cyber Psychology & Behavior* 11, no. 1 (2008): 61.
- Zarb, Michael P. "Modeling Participation in Virtual Communities of Practice." Master's thesis, University of Leicester, Leicester, U.K., 2006.
- Zetter, Kim. "How Humble Bbs Begat Wired World." *Wired*, June 2005.

THIS PAGE INTENTIONALLY LEFT BLANK

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California
3. John F. Timoney  
City of Miami Police Department  
Miami, Florida
4. Richard Bergin  
Naval Postgraduate School  
Monterey, California
5. Robert Josefek  
Naval Postgraduate School  
Monterey, California